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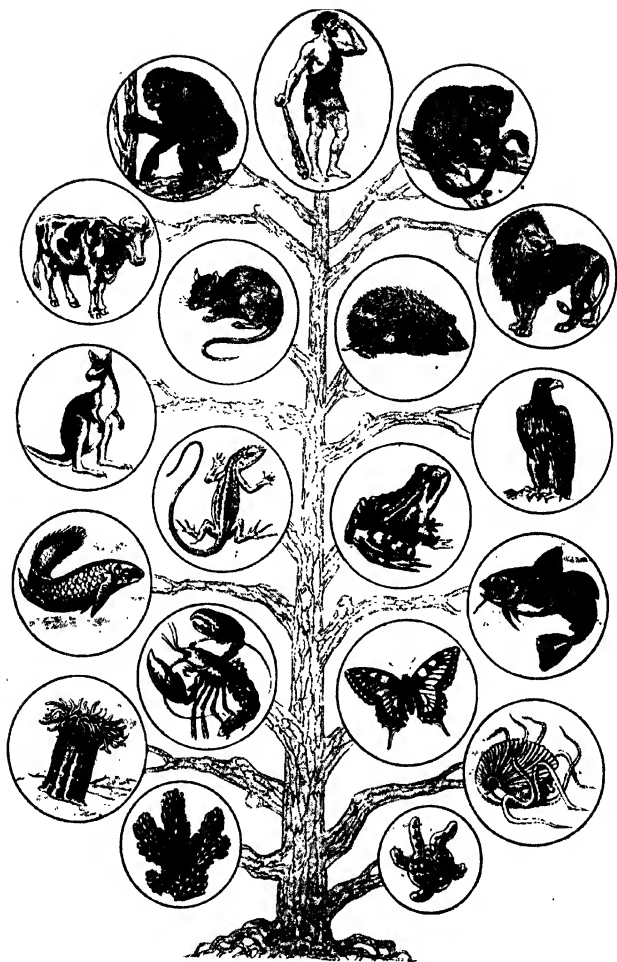
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THE WORLD'S
WONDER STORIES

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THE TREE OF LIFE.

Frontispiece.

THE WORLD'S WONDER STORIES

BY

ADAM GOWANS WHYTE,

*Author of "A Comedy of Ambition," "The Templeton Tradition,"
"Yellowsands," etc.*

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TO

C. B.,

*Whose interest in the welfare of children
induced the Author to write this book*

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THE WORLD'S WONDER STORIES

CHAPTER I

HOW? WHY? WHEN? WHERE?

WHEN Gerald was about four years of age he used to say : " If I see anything I don't know about, I just *mention* it."

He was very fond of the word *mention*. It sounded " big " and made him feel grown-up. But his father and mother, and his aunts and uncles, knew that Gerald did a great deal more than just mention things he was puzzled about. He asked questions till the real grown-ups were tired of answering them or " gave them up."

How? Why? When? Where? How did his hair grow? And why did it hurt when it was pulled and not when it was cut with scissors? Where did the sun spend the night? When was the chicken put inside the egg, instead of the white and the yolk that tasted so nice at breakfast?

In those days he was always asking questions like these. Now that he is fourteen years of age and has won a scholarship, he does not ask nearly so many questions. He is so busy learning things in books that he has no time for how, why, when, and where.

All boys, and all girls too, are very much like Gerald. When they are tiny babies they know nothing. They feed and sleep and cry. Later on they begin to "take notice." They lie and stare at bright lights. They turn their heads when they hear a sound. They laugh when somebody laughs at them; and they amuse themselves in a very noisy way. Soon they learn to take things in their hands, and then to put them in their mouths to see what they taste like. By-and-by they are able to say a few easy words, and so begin to learn to talk and to ask questions about everything they see or hear or feel.

When they are old enough to go to school, their fathers and mothers and teachers give them books to read. Books are just answers to questions. Sometimes they answer the questions that boys like Gerald are in the habit of asking. But far more often they answer questions which no child would ever think of asking for himself.

I never heard any boy or girl (who had not been to school) wonder what nine times eight made, or in what year William the Conqueror landed at Hastings. These are things that Gerald and all the rest of you are *taught* at school. You have to

answer questions about them. And the teachers who know that the Multiplication Table and History will be useful to you when you grow up, keep on teaching you, and examining you until you show that you have learned them off by heart.

THE TOPSY-TURVY SCHOOL.

All the same it is a pity to stop asking questions. Just think what fun it would be if school were a place where the children asked questions and the teachers tried to answer them! In this Topsy-Turvy School, Gerald and all the rest of you would do the talking, and the teacher would be examined by one boy or girl after another.

When the class had met, the "lesson" would begin something like this: Gerald, who had been rambling in the country last Saturday, would ask, "Why have rabbits got white tails?"

This might puzzle the teacher, unless he had learned as much about animals as about Latin and Greek. But he ought to be able to tell Gerald that rabbits are timid and helpless creatures who live in holes, and that when one of them sees a dog or a man or any other dangerous thing, he wants to signal to all the others. What the rabbit does is to bolt for the nearest hole, and the bobbing up and down of his tail as he jumps along is a danger signal to all the other rabbits. So when one scurries for home, all the others scurry.

Lots of other questions could be asked about rabbits, such as why their teeth are different from

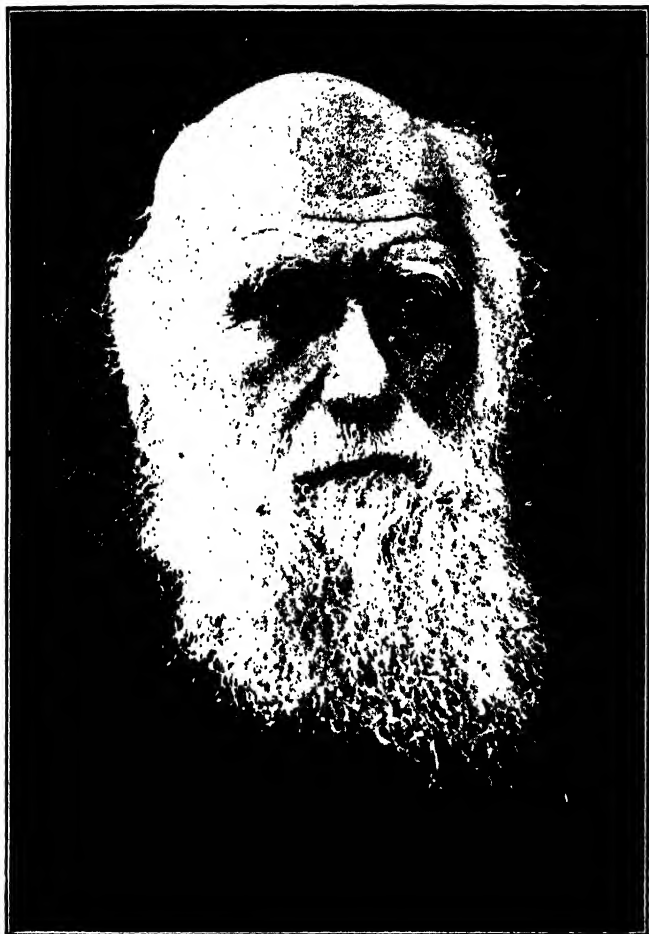
a dog's teeth, and how they make their burrows. If everybody in the class asked questions like that, the teacher would be kept very busy. And by the end of the lesson he would have told the class all about rabbits.

In the Topsy-Turvy School the prizes would be given to the pupils who asked the cleverest questions. But in the real school the boys and girls are very shy about asking questions. They are so anxious to make people think they know everything that they would rather not "mention" anything they do not know about.

Plenty of grown-up people are just the same. They do not like to confess that they are still learning. That would be like confessing that they are still at school! When they have left school and gone through the University (which is just a big school for older pupils) their education is supposed to be "finished."

All the same, the wisest men are those who are always learning. *Their* education is never finished. They are not too proud to go on asking questions even if they are a hundred years old.

One of the wisest men who ever lived was Charles Darwin, and he was always more ready to say "I don't know" than "I know." The more he got to know about things, the more he felt was still to be learned about them. He was always wondering about the ways of plants and animals—wondering how the bees made their combs of such neat little six-sided boxes packed together; how the



CHARLES DARWIN (born 1809 ; died 1882), who found out how the different kinds of plants and animals came into the world. He was buried in Westminster Abbey.

earth-worms helped the farmer by making those queer little wormy piles you see on the grass lawn; how the fantails, the jacobins, the pouters, the carriers, and all the other breeds of pigeons came into the world. Right up to the time he became a grandfather he was just like Gerald at four years of age. He was always ready to *mention* anything he did not know about.

When Charles Darwin died, he was buried in Westminster Abbey, where only the greatest of Englishmen are buried. If he had stopped asking questions when he grew up, he would never have made his wonderful discoveries about plants and animals. He would never have been great.

I do not promise that you or anybody else will become as great as Charles Darwin by keeping on "mentioning" things. But I do promise that the world will become a more delightful place if you try to learn more about it. As R. L. Stevenson says in a poem called "Happy Thought":—

The world is so full of a number of things
I'm sure we should all be as happy as kings.

A STORY-BOOK THAT NEVER ENDS.

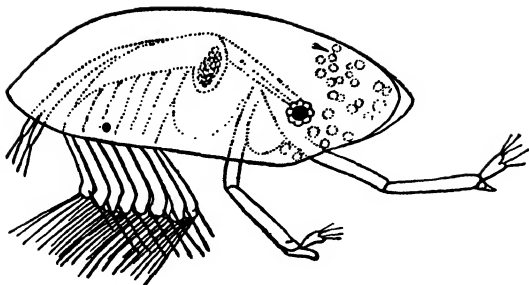
In the Bible (1 Kings xvii) you can read about the widow's cruse which never was empty. The more oil she took out of it, the more there was to take out. This sounds like magic, or like some of the stories of fairy purses or fairy bags of jewels. But the world is just like the widow's cruse. The

more you learn of its secrets, the more remains to be learned. The more you know about birds, and trees, and rocks, and clouds, and stars, the more there is waiting to be learned. It is like a story-book that never ends and gets more interesting as you go on with it.

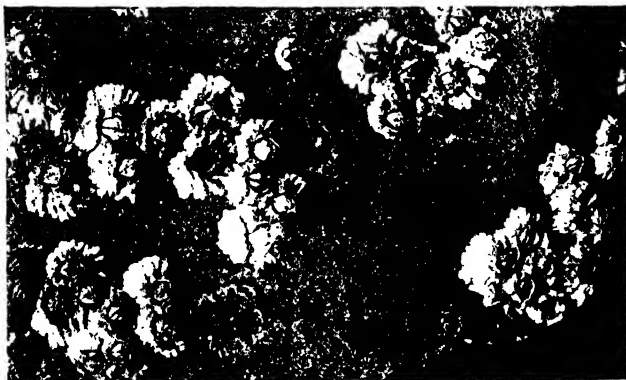
When I was a little boy, I used to hear people say that "curiosity killed the cat." I never could find out exactly how it happened, but I believe the cat wanted to know what was at the bottom of the cream jug, and in trying to find out he stuck his head tightly down the neck of the jug and could not get it out again.

I was sorry for the cat, because I always had a kind of liking for him. He was more fond of adventure than the lazy sleepy cats that never wanted to find out anything. And, after all, a cat cannot do more than go and look for himself. Being dumb, he is not able to "mention" things to his uncle.

At any rate, I would rather be an adventurous cat than a barnacle. Barnacles are the hard, rough things that cover rocks on the seashore or cling to the hulls of ships that have lain at anchor for a long time. If you have ever bathed on a rocky beach, it is very likely that you have scraped your toes on the sharp edges of barnacles. Each of the little lumps hides an animal which began life as a free and easy swimmer. The young barnacle travels wherever he pleases in the water, and is able to look around him as he goes. But by-and-by he



THE BABY BARNACLE, which leads a free life swimming through the water. The spot like a daisy is the baby barnacle's eye. At the end of its front "feelers" are two suckers by which it clings to rocks or the hulls of ships.



After the Baby Barnacle has fixed itself to a rock it sheds its shell and grows a new shell of the shape shown in this picture. It loses its eyes, and its swimming feet are changed into food-catchers.

To face p. 6.

THE BUSY CAT-FISH

fastens himself on a rock, builds a house of shell around him, and *goes blind*. No more adventure for him! He just sits all the time in his little house, and eats the food that the sea washes in at the door.

Some people do the same sort of thing when they grow up. As youngsters they may have been as curious as any cat. They may have travelled about and seen something of the world. They may have read books about all sorts of interesting things. But the time comes when they are not curious any more, when they stick in the same place and do not read or wonder or puzzle their heads about anything new. Then they live inside a shell and are blind to all the bustle and fun that go on around them.

The only way to keep from becoming a barnacle is to keep on asking questions.

THE BUSY CAT-FISH.

Talking of cats reminds me of the cat-fish. The cat-fish is a very lively fish that is very fond of chasing live cod. If you found a cod-fish that could talk, and caught him in a chatty mood, he would tell you that the cat-fish is a perfect terror. Just when the swarm of cod-fish are having a quiet pleasant time along comes the cat-fish and sends them scurrying for their lives. He gives them no rest.

But if the cod-fish knew as much as you or I do, they would feel that the cat-fish is really a good

friend. He keeps them from getting fat and stupid by giving them plenty of exercise.

The ships that trawl for cod-fish in the North Sea have a tank on board, with holes through which the sea is allowed to wash. The fish are put into this tank after they are caught in the trawl. You might expect that the salt-water would keep the fish nice and fresh until the ship sailed up the Thames and brought its catch to the Billingsgate market. But the fishermen found that the fish got fat and soft, because they were cooped up in the narrow tank. One clever fisherman hit on the happy idea of keeping a cat-fish in the tank. This cat-fish chased the cod-fish all the time, and so kept them in good condition for the market.

School teachers are a kind of cat-fish, because they are always stirring children up to use their brains. Books are a kind of cat-fish, because they keep your mind moving. Curiosity is a kind of cat-fish, because it does not let you rest until you have found out all you can. And the world itself is a kind of cat-fish, because it is always saying to people with their eyes and ears open: "Here is something to look at, something to hear."

So if you want a motto, there is no need to choose one of the pompous Latin phrases that our grandfathers were so fond of. All you need to do is to take the "little crooked thing that asks questions"—the "mark of interrogation," as it is called in your school books. ? is the badge of all great men and women.

Charles Lamb, who wrote the *Essays of Elia*,

tells a very amusing story about some people who had forgotten the mark of interrogation. It is a story that has to do with Roast Pig and Chinamen.

Ho-ti was a Chinese swine-herd, and Bo-bo was his son, "a great lubberly boy." One day, when Ho-ti was away from home, Bo-bo was playing with fire and let some sparks fall on a bundle of straw. The burning straw set fire to the house, and inside the house was a litter of baby pigs. By the time the house had been burned the pigs were nicely roasted. For the first time in his life Bo-bo sniffed the smell of roast pork. He stooped and pinched a burnt pig to see if there was any life left in it. It was so hot that it burnt his fingers, and when he licked his fingers to soothe the pain he *tasted* roast pork—again for the first time in his life.

His father came home and found him eating roast pork as fast as he could. Ho-ti was very angry to find his house burned down, but *his* first taste of roast pork cured his anger. Between them, Bo-bo and Ho-ti finished all the roast pork. Then the neighbours began to notice that Ho-ti's house used to go on fire very often. Whenever a new litter of pigs appeared, the house would be in a blaze.

After a time the secret was found out, and the neighbours began to imitate Ho-ti's way of roasting pigs. Houses were seen on fire all over the place. *Everybody thought that, because Ho-ti roasted pigs by burning down his house, pork could not be cooked except by burning down a house.*

The house-fires went on until a wise man asked

himself questions about the roasting of pork. He made the discovery that any sort of fire would cook pork. And I suspect that when he told the people about his discovery they thought he was talking nonsense. In time, however, they got out of the way of burning down the house to get their Sunday dinner.

ARE WE VERY DIFFERENT?

This may seem a very fanciful story. It may even read like a fairy-tale. You may tell me also that we are very different from the Chinese, who do nothing but imitate what they see done. You will tell me the old story about the Chinese tailor who was given an old pair of trousers as a pattern, and who made a new pair with all the patches and everything else exactly as in the old pair. But we are all very apt to do things just as they were done before, without thinking how they might be done better. We all find it easier to imitate than to find out anything new.

For example, it was a very clever man who invented the umbrella. We are so used to umbrellas that we can hardly imagine the time when there were none at all. But the first man who appeared in the streets of London with an umbrella over his head was followed by a laughing and jeering crowd.

The onlookers did not stop to think that the umbrella man was keeping himself dry while they were getting wet. Nobody had ever carried an umbrella before! So they thought the umbrella

a great joke, and went on laughing at it until they got used to seeing it. Then they went and bought umbrellas for themselves.

When I was about your age, all the bicycles had wheels just like the wheels of baby's perambulator. The tyres were not pumped full of air, so as to make a soft cushion between the rim and the road. They were of solid hard indiarubber; and if anyone tried to ride a bicycle fast along the road he went bumpity-bump in a very uncomfortable way. By-and-by a man named Dunlop hit upon the notion of making the tyre hollow and filling it tight with air. This invention was the *pneumatic* tyre, so named from the Greek word *pneuma*, meaning air.

Mr. Dunlop wanted to show people that his new tyre was better than the old tyre. So he got men to ride bicycles with pneumatic tyres in races against bicycles with solid rubber tyres. When the bicycles with the "sausage wheels," as people called them, came on to the race-course for the first time, the crowd greeted them with roars of laughter. They seemed such clumsy things, alongside the bicycles they were used to seeing. But when the "sausage wheel" bicycles won race after race, nobody could deny that Mr. Dunlop was right. People changed their minds very quickly, and now the pneumatic tyre is fitted on every bicycle and every motor car. Even some perambulators have pneumatic tyres.

And now, if ever we see one of the old-time bicycles with the solid tyres, we smile at the funny-

looking spindly thing. Just because it is so different from what we are used to!

**“WHAT IS GOOD ENOUGH FOR GRAND-
FATHER.....”**

I could fill a book with things of this sort, showing how apt people are to despise anything new without stopping to wonder if it is not better than the older thing.

I do not want you to think that everything that is new is good. Lots of new notions and inventions are just as stupid as any old one. As soon as they are tried they prove a failure. But the queer thing is that so many people refuse to try them, or even to think about them at all. “What is good enough for Grandfather is good enough for anybody!” That is the sort of way they speak when a change is talked about. And if all of us talked like that, the world would never get better. We would still be like the first savage men, living in caves, dressing in skins, feeding on raw flesh, and killing each other with stone hammers.

In some countries you find people doing things exactly as their ancestors did—hundreds of years ago. If you go to Portugal, one of the first things you will see is a heavy cart with four wooden wheels, drawn by oxen. You will smile at this cart, because it looks so very ancient. It *is* ancient. It has hardly changed since the days when this old world was young. If you look at it closely, you will see that both pairs of wheels are *fixed*.

WHAT IS GOOD ENOUGH FOR GRANDFATHER 13

Our four-wheeled carts are made with the first pair of wheels movable, so that when the horse turns round a corner the wheels move round with him. The steering wheel of a motor car moves the front wheels in much the same way, so that the car can run easily round corners and in and out of the traffic. But the Portuguese ox-cart does not *steer*. When it comes to a corner the oxen have to drag the front wheels sideways. The wheels do not roll smoothly; they "skid," and in skidding they plough up the road.

This is, of course, very bad for the road. A road ought to be smooth, and no road can keep smooth if heavy wooden wheels are being forced sideways over it. Some years ago the Portuguese Government made a law that all carts were to be altered so as to make the front wheels "steer," as in other countries. But do you think the people would agree to so simple and so useful a change? Oh, no! They would rather break the law, pay fines, and go to prison than change their old habits. What was good enough for their grandfathers was good enough for them.

To this day you will find the fixed wheels ploughing up the roadway. To this day you will find the ox-carts built exactly as the first one was built, away back before history began to be written.

This shows how strong a custom may be. In Portugal the old custom of making ox-cart wheels fixed is so strong that people refuse to alter a cart so that it would run more easily and keep the roads

from being torn up. They obey the custom rather than think for themselves and do what they see to be best.

WHERE CUSTOM IS SACRED.

If you go still further than Portugal, across the Atlantic Ocean and up the great Amazon River, you will come in time to a region covered with dark forests. The Indians who dwell there are savages. When they hold a religious feast they kill a man and eat him. All their tools are of wood, and when they fight they kill each other by blowing poisoned darts through long pea-shooters. Very few of them are able to count above five.

Another very curious thing about these cannibals is that their children are hardly ever punished by their parents for anything they do. Perhaps you would like to be a child in that country! But what I want to mention most of all is that their language has no such words as "virtue," "vice," "justice," or "cruelty." It would be no use trying to explain to a cannibal Indian that it was wicked to chop off a man's head with a wooden sword and eat his body. He would not know what you meant by "wicked." And if you asked him why he killed a man as a religious sacrifice (just as Abraham went to sacrifice Isaac—Genesis, xxii) he would answer with the word *pia*.

Pia means custom. It is the custom to kill a man and eat him at a religious ceremony. So the Indian thinks it is the right thing to do. Even the

victim himself thinks so much of *pia* that he thinks he is honoured by being chosen as the one to be beheaded and eaten !

•
"EVERYBODY DOES IT."

Now let us get right home again and take a look at some of our own customs.

I expect you have often noticed a horseshoe nailed over a doorway. When you ask why the shoe is put there, you will be told that it is "for luck." And if, like Gerald, you go on asking questions and want to know how an old shoe can make any difference to the fortunes of those who live in the house, all that most people will be able to tell you is that "it is the custom." "Everybody" does it; and what everybody does must be right and wise !

We have lots of customs that are pleasant—such as "ducking" for apples on Hallowe'en night, and hanging candles and presents on trees at Christmas time. You can get plenty of fun by asking grown-up people why everybody should be doing the same thing at certain times like Hallowe'en and Christmas. Why, for example, should we give each other eggs at Easter? Most of the grown-ups will not be able to tell you much more than that "we always did it." That is to say, it is the "custom."

All the customs that have to do with Christmas, Hallowe'en, Easter, May Day, and New Year's Day are very, very old—older, indeed, than history.

They were not always so harmless as they are

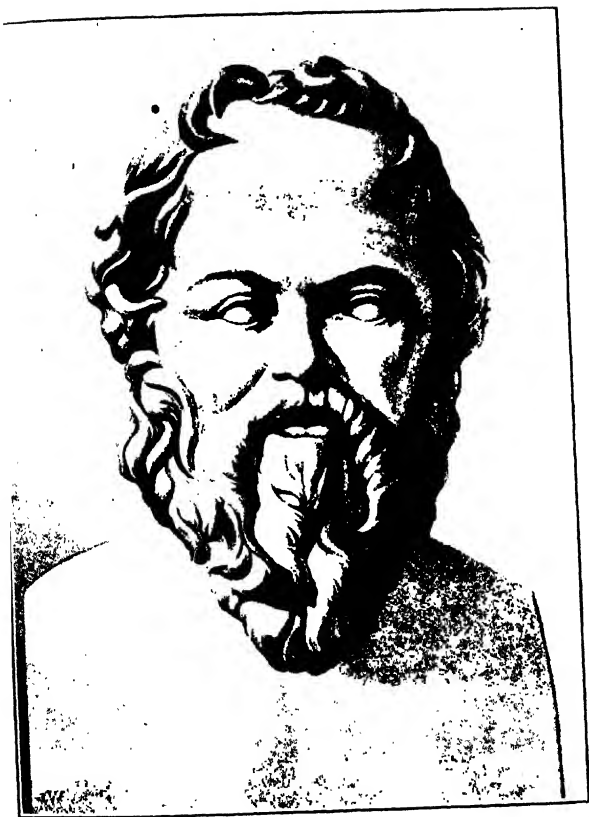
now ; and when you read about the customs of ancient races you find much that seems wicked and dreadful, like the custom of the Amazon Indians in eating human flesh when they go to church. Many old customs have "died out." They have been killed by people beginning to ask questions about them, and so finding out that they were bad.

SOCRATES.

Once upon a time there was a great man whose hobby it was to ask questions. Whenever he met anybody who said "I think so-and-so" or "I believe such-and-such," Socrates would ask him why he thought so-and-so or believed such-and-such. Socrates was one of the wise men of ancient Greece ; and among those men whom he trained to ask questions were young men who became the wisest teachers of their day—between four hundred and five hundred years before Christ. He and his disciples are still honoured for their wisdom.

Yet it is a fact that Socrates was condemned to death as a dangerous man ! The rulers of Athens, where Socrates lived and taught, did not like a man who was always making people wonder if these rulers were as wise and good as they seemed to be. Socrates was like a cat-fish among the cod-fish ; he wanted to have everything their own way. So the cod-fish put him in prison and held a trial over him and decided that he must die.

Some day, when you are a little bit older, you



SOCRATES (born 468 ; died 399 B.C.), a wise man of ancient Greece who taught people by asking them questions.

will read the noble story of the death of Socrates. Although he had to die by drinking a cup of poison, he faced death with all the courage of a soldier on the battlefield. His disciples, who stood around him, were not so calm as he was. "I know not what death is," he said to his judges; "it may be a good thing, and I am not afraid of it. But I do know that it is a bad thing to desert one's post, and I prefer what may be good to what I know to be bad." So he died, rather than give up the right to find out the truth about everything.

It may seem queer to you that in ancient times people should actually put a man to death because he did not teach what they believed. But it is only about a hundred years since the British people used to hang men for stealing sheep, so we must not be too hard on the Greeks of more than two thousand years ago. And in your history books you will come across many men who were persecuted because they taught something new.

When it is the *custom* for the great people in a land—the kings and nobles and priests and philosophers—to believe certain things, it is dangerous for any man to teach something different, because these great people do not like to be proved wrong. They believe that their way of thinking is good, and that any other way of thinking must be bad. So they become very angry when a bold man comes along and shoots questions at them. If they can frighten him into keeping quiet, they do so. If he will not be frightened, they try to punish him.

COPERNICUS AND GALILEO.

Jesus Christ was persecuted by the Jews because he preached things which did not agree with the Jewish religion. And hundreds of years later the Christian Church persecuted men for preaching things which did not agree with what the Church taught.

In the year 1543 Copernicus published a book stating that the earth moved round the sun. This is the same as you are taught in school—that the earth is a huge ball which travels in one year round the much bigger ball of fire we call the sun. But in the days of Copernicus everybody thought that the earth was the centre, and that the sun moved in a circle round it.

Later on Galileo, an Italian astronomer, made the first telescope. With this telescope he watched the heavens and studied the sun; and from what he saw there he was sure that Copernicus was right and everybody else wrong.

What happened to Galileo? You might think that he would have been hailed as a great man for his wonderful discovery. He was not. The Roman Catholic Church, which had great power in those days, happened to teach that the earth—not the sun—was the centre of the heavens. When Galileo wrote a book suggesting the opposite, the Church forbade people to read the book, and called upon Galileo to deny his own teaching, threatening him with torture and with all sorts of other pains and



COPERNICUS (born 1473; died 1543),
the astronomer who first taught that
the earth moved round the sun.



GALILEO GALILEI (born 1564; died 1642), who
made the first telescope, and proved that
Copernicus was right.

penalties. It was not easy for anybody to defy the Roman Catholic Church at that time; and Galileo was old and ill. After a struggle he gave in, but the Church set him apart as a dangerous man for the last years of his life.

Galileo, you see, died in ruin and disgrace. But his memory still shines brightly like one of the stars he was so fond of watching and learning about. He was a great man. Everybody who knows anything about astronomy honours the name of Galileo. Yet nearly everybody has forgotten the names of the Popes and Cardinals who worried the poor old man into his grave. These Popes and Cardinals are looked down upon now because they persecuted a man who found out a new truth and told the world about it.

BRUNO AND SERVETUS.

If you read the history of those times, you will learn that Galileo was lucky in escaping with his life. In 1600 a very clever man, named Giordano Bruno, was burned at the stake in Rome. Why? Because he, like Galileo, taught in a different way from the Roman Catholic Church. A statue erected to his memory now stands on the spot where he was burned.

A little earlier—in 1553—Servetus was burned at Geneva. Servetus was a Spaniard, and he did not agree with the teaching of Calvin, who was one of the leaders of the Protestant Reformation. Calvin first put him in prison, and later ordered him to be

killed, since he would not bow the knee and admit that he was wrong. And just as a statue to Bruno stands in Rome, so one to Servetus stands in Geneva.

It is pleasant, however, to know that the statue to Servetus was erected about twenty years ago by the Calvinists themselves—that is to say, by the people who still believe in the teaching of Calvin. They put up the statue as a sign that they looked upon the burning of Servetus as a crime.

Nowadays people are not burned at the stake if they preach something quite new that the Churches think to be quite wrong. We are not so cruel. All the same, I can remember the time when men were put into prison for writing books or making speeches to prove, as Galileo and Bruno and Servetus tried to prove, that the Churches were mistaken.

Putting these men in prison did not show them to be wrong in the things they taught. They were put in prison because all the other people were angry with them. If ten thousand men have believed all their lives that the sun moves round the earth, they get very much annoyed when somebody pops up and says: "You are all wrong; the earth moves round the sun."

You yourself, I am sure, have many little squabbles with other boys or girls about things you have learned. *You* think *you* know, and the others think they know. And you go on saying "Yes it is," and "No it isn't," until you all lose your tempers. It is not at all easy for you to say: "Well,

perhaps you may be right, and we will look it up in the dictionary or ask teacher about it."

And what a dreadful time you would have if you thought one thing and all the others in the school thought the opposite! They would all jump on you and tell you to be quiet. Yet if they began to ask questions about it they might find that after all you were right and they were wrong.

CHARLES DARWIN AND THE ANIMALS.

The same sort of thing happens in the world of grown-up people. You remember what I told you about Charles Darwin, the man who was always asking questions. Well, it so happened that Darwin found out something quite new about animals. Everybody used to believe that all the different kinds of animals had been "created"—that is to say, made out of nothing—on the same day: lions, tigers, cats, dogs, monkeys, mice, fleas, elephants, lizards, frogs, bees, alligators, and all the rest of them. Each kind of animal was supposed to be as different from every other kind as Teddy Bears are different from the tin soldiers and the mechanical mice in a toy-shop.

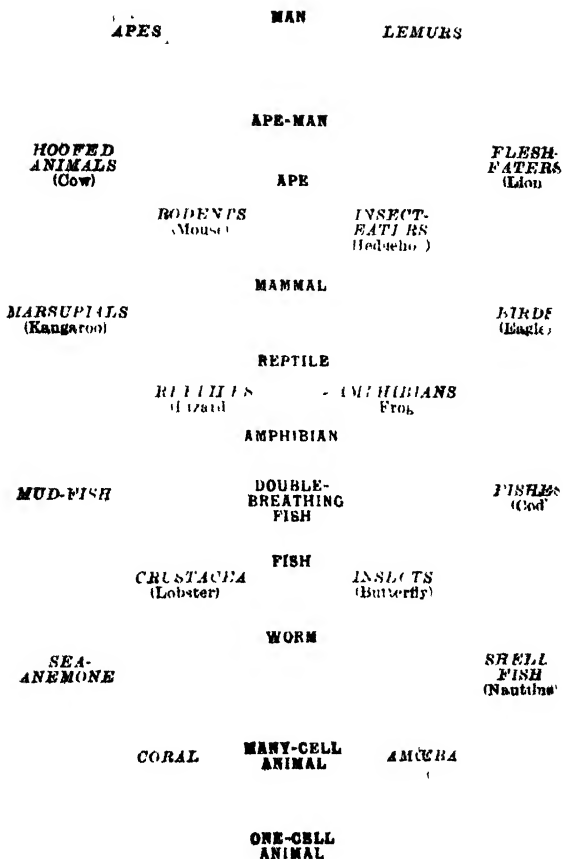
But Darwin wrote a book to prove that all the animals were like one great family. He showed that the dog was a kind of cousin to the wolf, the cat to the tiger, the zebra to the horse, the lizard to the serpent, and so on. He also showed that different kinds of animals might have had the same

great-grandfather. For example, all the different kinds of pigeons—such as the pouter, the fantail, the jacobin, and the carrier—had grown out of the wild rock pigeon.

Some day, I hope, you will read the great book that Darwin wrote to explain all this. He wrote it more than fifty years ago, and now most people agree that he was right in what he said. At the time, however, most people thought he was wrong, and he was said to be a very wicked and dangerous man for writing such a book. Many of those who said his notions were all nonsense knew nothing about animals. They had never asked themselves questions about animals. Darwin set them wondering, and the more they wondered the more they came to see that they had been shutting their eyes to the truth.

You may have heard it said that "It takes two people to make a quarrel." This is not always quite true. Hundreds of people quarrelled with Darwin over the question of "Where did the animals come from?"; but Darwin never quarrelled with them. He listened quietly to all they had to say against his answer to the question, and he never let himself be annoyed when ignorant people called him names. He was quite sure that truth would win in the end. And he was right.

All the same, he was a very bold man to say the exact opposite to what everybody around him—great people and wise people as well as stupid people—were saying. He set out to fight a custom;



THE TREE OF LIFE, showing how Man is related to simple kinds of animals (see Chapters V and VI)

Drawn by T. A. Brock.

Frontispiece.

and the war lasted for thirty years or more. People's minds had got into the habit of thinking one way; he forced them to think another way by showing them things which their eyes had not seen. Even when he put these things right under their noses, some people said they could not see them. That was because they wanted to see something quite different.

"THE EMPEROR'S NEW CLOTHES."

"There are none so blind as those who will not see." That is another proverb. And if you want to know just what it means, you should read the story of "The Emperor's New Clothes" in Hans Andersen's Fairy Tales.

The Emperor was so fond of new clothes that he was always dressing up in a new suit. One day two rogues came to the royal city and gave out that they could weave most beautiful clothes which would be invisible to anyone who was a fool, or who was not fit for the office he held. When the Emperor heard of these wonderful clothes he gave money to the rogues for a suit, and he also sent the Prime Minister to see the clothes being woven. The rogues showed the Prime Minister some empty looms, at which they pretended to be working; and, although he saw no cloth whatever, he did not like to admit it, as he thought that people would call him a fool or say he was unfit for his position as Prime Minister. So he went back and told the Emperor that the cloth was beautiful.

The same thing happened with another officer of the Court. It happened also with the Emperor himself. The rogues pretended to dress him up in gorgeous clothes for a public procession; and when he appeared in the street the crowd exclaimed: "Oh, how beautiful are our Emperor's new clothes! What a magnificent train there is to the mantle! And how gracefully the scarf hangs!" No one dared to say that he saw nothing, until a little child cried out: "But the Emperor has nothing on at all!"

Then everybody knew that they had made fools of themselves. The Emperor knew that he was the biggest fool of all, but did he run away and hide himself? Oh, no! He let the procession go on; and the Lords of the Bed-Chamber took more pains than ever to pretend that they were holding up a train.

The little child was wiser than the Emperor, the Court, and all the other people, because he saw what was really there and not what others said he ought to see. But the Emperor and the Court, having once started the pretence, felt that they must keep it up.

I expect that the little child's name was Gerald. At any rate, he saw something he did not understand, and he just "mentioned" it!

A GLANCE BACK.

Now that you have read this chapter, I wonder how much you remember of it? I do not want to examine you on it, because that might make you

think you were at school, instead of reading a story book about the world. I want to help you to remember, so I pick out some of the biggest apples in the basket, and put them in a basket by themselves :—

Young children are very fond of asking questions.

It is a pity for them to stop asking questions when they begin to grow up.

The wisest men are those who are always asking questions, always learning.

If nobody thought new things and did new things, the world would never get better.

Every country has its habits or "customs," some good, some not so good, some bad. The world gets better by making its customs better.

Great men tell the world how to make its customs better.

Many people do not like to have their customs changed, and they get angry with the great men who tell them that their customs are wrong.

That is why so many great men—Socrates, Galileo, Servetus, Darwin, and others—have been badly treated.

Most people are apt to see what they think they ought to see.

Wise men are like the little child in Hans Andersen's story of "The Emperor's New Clothes." They use their own eyes to see things as they really are.

CHAPTER II

HOW WAS THE WORLD MADE ?

HOW was the world made ?
This is a little question—only five words of one syllable each. Yet the answer might fill all the books in the British Museum Library, which is the biggest library in the world. Even then the question would not be quite answered.

The world is, you see, a very big affair, and, as the poet Stevenson said, it is “full of a number of things.” The oceans are full of all sorts of strange fish and weeds; the land has mountains, rivers, lakes, and deserts. Beneath the land are volcanoes which spout out steam and melted rock. Buried in other rocks are the bones and shells of animals that lived and died millions of years ago. A multitude of plants grow upon the land. A multitude of animals run, crawl, creep, or burrow on the surface of the land. Even a drop of water from a pool holds a crowd of animals; they are so tiny that they cannot be seen except through a strong magnifying glass. Over the earth lies the air, which is the home of the wind and of the rain-clouds, and through which fly thousands and thousands of all sorts of birds.

All I can give you in this chapter is a little bit of an answer about the earth itself—that big ball, shaped like an orange, that the school teachers are sure to have told you about. I shall have something to say about the plants and animals later on.

I have been trying to remember just how old I was when I began to wonder how the earth was made. All I can remember is that when I was a very little boy I had a very queer notion of what the world was like.

THE THREE QUEER TABLES.

I thought the world was a great flat thing, like a huge round table, floating in the sky with a pretty fringe of clouds all round it. There was nothing on the underside of this table, but on the top there were towns and forests and fields and rivers. And somewhere among them were the house where I lived and the garden where I played.

Above this table was another table, also floating in the sky. This table was the home of the angels. It was the place where good people went to after they died. In a word, it was Heaven.

Below the earth floated a third table, which was not quite so pretty as the earth-table and not nearly so splendid as the heaven-table. It was the place where the bad people went to after they died. In a word, it was Hell.

When I went to school and learned a little about astronomy, I found that my nice little picture of

the three floating tables was all nonsense. I was told that the earth was a ball, so huge that if I started to walk round it as fast as daddy walked to the station in the morning I would have to go on walking night and day for the best part of a year before I got back to the place I started from. I also found out that the moon was the nearest thing to the earth—and it was a cinder, 238,800 miles away. The earth, instead of floating, was moving at a terrific rate round the sun, which was 1,300,000 times bigger than the earth, and ninety-three millions of miles away. And as for the stars—well, the nearest one was so many millions of miles away that it was a marvel we could see it at all.

You have heard about the ancient Romans who invaded Great Britain and laid down Roman roads, built Roman camps, and made Roman walls which can still be traced. In those ancient times the people knew as little about astronomy as I did until I had been some years at school. Long before the days of the great Julius Cæsar, men used to have their own notion of what the world was like, just as I had when I amused myself with the picture of the floating table with the fringe of cloud.

Savages make up the same kind of pictures to this very day. In Honolulu the natives believe that the world was made by two gods out of a "gourd calabash," which is a vegetable shaped like a bowl with a cover over it. One of the gods was called Wakea; and the other god was his wife. Funnily enough, the wife was called Papa!

According to the story, Papa "once upon a time" made a gourd calabash, complete with the bowl and cover, and with the pulp and the seeds inside, like what you see in a vegetable marrow. Wakea lifted the cover up, and it became the heavens. Out of the pulp and the seeds he made the sky and the sun and the moon and the stars. Out of the juice of the pulp he made the rain; and out of the bowl he shaped the sea and the land.

THE ANCIENT BABYLONIAN STORY.

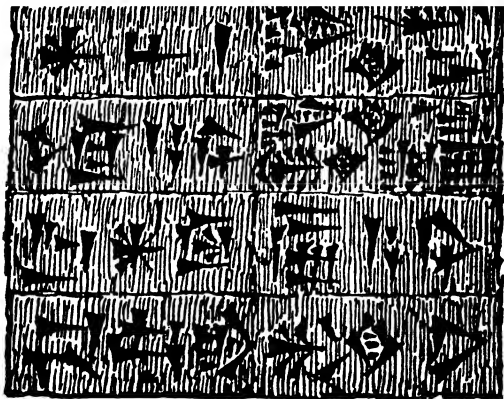
Stories of this kind are told by fathers and mothers to their children; and when these children grow up and have children of their own they tell the story again to their little ones. So the story is handed down until everybody has forgotten who first made it up. Sometimes it happens that the stories are written down. In ancient Babylon the people learned to "write" by making marks on slabs of clay which were afterwards baked in the sun.

If you take one of the wooden "bricks" you used to build houses out of, and push a corner into a piece of plasticine, you will make almost the same sort of mark as the Babylonians did when they "wrote."

About six hundred years before Christ—that is to say, about two thousand five hundred years ago—a King of Assyria, called Assur-bani-pal, made a collection of these clay tablets with writing on

them. He put this collection in his palace at Nineveh. Less than twenty years after he died his palace was destroyed by invaders. Nineveh became a ruin, covered up by the sands of the desert. 12,715

Some years ago the sands were dug away and some of the old clay tablets were discovered. Clever



An Ancient Babylonian Clay Tablet with "writing" done by pressing a sharp edge into soft clay, which was afterwards baked into brick. This inscription reads: "Beltis his lady has caused Uruk the pious chief, King of Erech and King of the land of the Akkad, to build a temple to her." Clay tablets like this have been found with stories of how the world was made and how the first man and woman came into the world.

men studied the marks until they were able to read them, and they found among the tablets a story of how the world was made.

There was a very curious thing about this story. It was found to be very like the story of the creation

of the world that you read at the beginning of the Book of Genesis.

Then people began to wonder whether the story on the tablets had been taken from the Bible, or whether the Bible story had been taken from the tablets. It was not an easy question to answer, as nobody knew when the two stories had first been written. After a while it was decided that both stories had come from an earlier story told by the ancient Babylonians who were conquered by the Assyrians. The stories were like two children with the same father.

I expect you know the Bible story almost off by heart. It starts with the words: "In the beginning God created the heaven and the earth." Then it goes on to tell how the dark and shapeless "heaven and earth" was made into the world as we know it.

On the first day light was brought into the world, so that day became different from night.

On the second day God made the "firmament." Perhaps you are puzzled by this big word "firmament"; and you will be glad to know that plenty of grown-up people have been puzzled by it too. "Firmament" means something solid and fixed, but your astronomy books do not tell you anything about any such thing in the heavens. You must remember, however, that the ancient Babylonians who told this story, and the ancient Hebrews who wrote it down in their Bible or sacred books, knew very little about astronomy. They had no telescopes. The sky seemed to them a great dome set over a flat

earth, and they thought that this dome was as solid as the earth itself.

On the third day the "waters under the heaven" were gathered together to make the seas, and so the dry land appeared. ' On the same day all the plants and trees were made and planted.

On the fourth day the sun and the moon were made—"the greater light to rule the day, and the lesser light to rule the night."

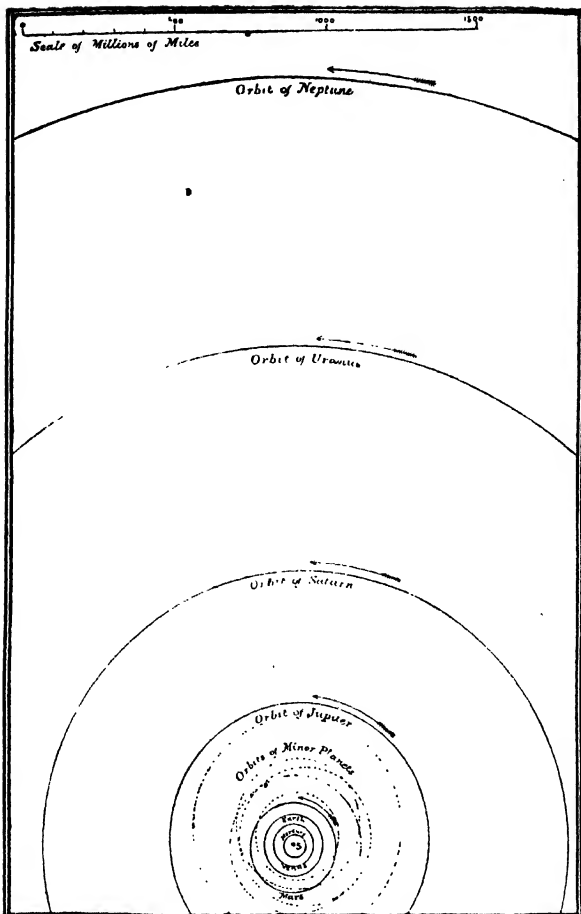
On the fifth day there came fishes and birds, and on the sixth day all the animals that live upon the earth—"cattle and creeping thing, and beast of the earth after its kind"—were created. Man was made on the same day to rule over the beasts and birds and fishes.

On the seventh day God rested from his work.

The story then goes on to tell how God made Adam and Eve, and what happened to them in the Garden of Eden. I shall say more about Adam and Eve in the chapter about "Who was the first man?" And I shall tell you about the beasts and plants in the chapter on "Where did all the plants and animals come from?" The earth is big enough to fill one chapter!

A SURPRISE FOR THE BABYLONIAN.

If the ancient Babylonian who wrote this story of creation on tablets of clay were to come to life again as a little boy and go to school with you, he would get a great surprise. When the teacher began to



The Sun and the Family of Planets—Mercury, Venus, the Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. The circles show the tracks of the planets round the sun. The line at the top of the picture stands for 1,500 million miles, and will help you to measure how far the different planets are from the sun.

talk about the "solar system," with the sun in the centre, and the planets Mercury, Venus, the Earth, Mars, Jupiter, Saturn, Uranus, and Neptune circling round the sun, this boy from Babylon would think he was listening to a fairy tale.

Other things that he would read in the astronomy book would fill him with amazement. From the sun to the furthest planet (Neptune) is 2,800 million miles—so tremendous a distance that no one can get any real idea of it into his head. Yet the sun with its family of planets—what the books call "the solar system"—is just a mere speck in the ocean of space.

When you look up at the sky on a clear night, the stars seem far away, but not so *very* far away. To the Babylonian boy, the stars he used to gaze at would not seem quite so far away as to you, since in his part of the world the air is clearer and the stars appear to be nearer because they are brighter. They are just like lamps hung on the firmament.

How near is the nearest of these lamps? If you want to put the distance down in figures, you must do a tremendous sum in arithmetic. You must multiply ninety-three million miles by 275,000. Here is the answer: 25,575,000,000,000 miles.

If that figure does not make your Babylonian friend sit up and stare, then nothing would! He used to think that the sky, with its millions of stars, was a kind of dish-cover over the earth! Now he discovers that the sun is ninety-three million miles away, and the nearest star 275,000 times further away than the sun.

I expect by that time he would ask himself the great question over again: "How *was* the world made?" If the earth is not flat, with the dome of the sky over it—if it is a ball circling round the sun—how did it come there?

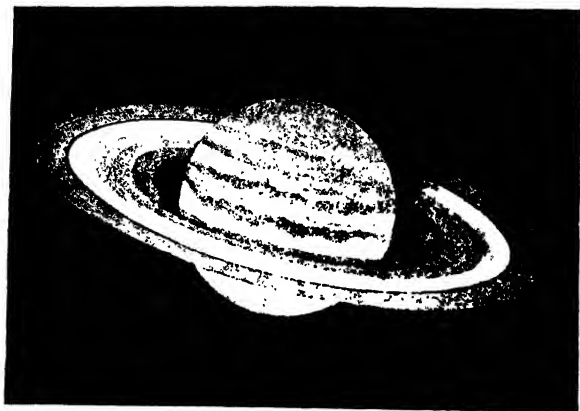
To answer this question, we have really to find out how the solar system was made. I have talked about the sun and its family of planets. The earth belongs to this family, and it has a child of its own—the moon—which circles round it just as the earth circles round the sun. Jupiter, again, has seven moon-children. Saturn has nine moon-children; with a beautiful system of rings as well. Uranus has four moon-children; and Neptune has one. So you have grandfather Sun in the centre, with the father planets travelling round him, and the children moons travelling round them.

THE WORLD'S BABY.

It is not fanciful to talk about the moon being the child of the earth. Many astronomers think the moon was once part of the earth. "Once upon a time" the earth was not "set" as it is to-day. It was a hot molten ball, spinning much faster than it does now. And it spun so fast that it flung a piece of itself away into space.

Next time you are out in the rain with your umbrella up, spin the umbrella round quickly. You will find that drops of water fly off from the ends of the ribs. This gives you some notion of how the moon might have been flung off the earth.

In the same way, Jupiter, Uranus, Neptune, and the other planets flung off their moons. In the case of Saturn, some of the bits flung off did not form balls like the other moons. They spread out into



Saturn, the wonderful planet, which has "rings" as well as nine moon-children.

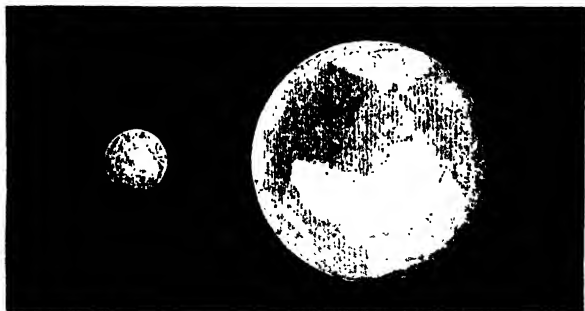
rings, making a beautiful picture to look at through the telescope.

WHERE DID THE PLANETS COME FROM?

Now, if the planets' children came from the planets, where did the planets come from? You will remember that the planets travel round the sun just as the moon travels round the earth, and just as the moons of Jupiter travel round Jupiter. Is not

this enough to make one suspect that the planets once belonged to the sun?

There is something else that makes one think that the earth and the other planets must be "chips of the old block." Supposing the earth was made of quite different stuff from the sun, then you could safely tell me that the earth could not have been made out of the sun. But supposing we find in the sun exactly the same things as we do in the earth,



The Earth and its child, the Moon. This picture shows how much smaller the moon is than the earth.

then we see that the earth might have been a part of the sun at one time.

And this is what we do find. Our chemists have examined the air, water, rocks, trees, animals, and everything else "under the sun," and they have named about seventy "elements" out of which all these things are made. Carbon, iron, oxygen, phosphorus, lead, and hydrogen are some of these

“elements.” They are the bricks out of which all sorts of substances are built.

If you know a little about chemistry, you will understand how a chemist can take a piece of stone, and, after crushing it and testing it with acids and so on, tell you what elements are in that piece of stone. In much the same way, chemists can tell us the elements in the air we breathe, the water we drink, the food we eat, and the clothes we wear.

I think you will agree that a man must be very clever to do that. What do you think, then, of being able to name the elements in a flaming ball ninety-three million miles away? There is no chance of getting hold of a sample of the sun and putting it in a test-tube. All we can do is to look at the sun.

WHAT IS THE SUN MADE OF?

Years ago an instrument called the “spectroscope” was invented. It is one of the most wonderful instruments in the world—quite as wonderful as the wireless telegraph, although people do not make any fuss about it. When you look through the spectroscope at the light of the sun, each element in the sun can be made to send a special light-signal to let you know it is there. These signals can be recognized because they are exactly the same as those sent by the elements on earth. In this way the spectroscope tells us that carbon, hydrogen, sodium, and the other elements that we can see and

weigh in our chemical laboratories are present also in the sun?

To show you that the spectroscope does more than guess at things, I may tell you how it discovered an element which nobody had ever known on earth. One of the light-signals sent from the sun was so strange that it pointed to the sun having one element of its very own. This element was called *helium*, from the Greek word *helios*, meaning sun. But after a while Sir William Ramsay—a great chemist, who died in 1916—discovered helium in certain rocks. It was recognized as helium because it sent through the spectroscope the same message as had been sent from the sun across ninety-three million miles of space.

That is one of the romances of science. It is part of the great romance of the making of the world. For it tells us that the earth is only a small part of the family of sun and planets, and that we cannot answer the question, "How was the world made?" without explaining all about the parent-sun and the other planet children.

Now let us have another look at the family—with a thermometer this time. A thermometer tells us how hot anything is. When the Doctor comes to see you he puts a tiny thermometer under your tongue to see how hot your blood is.

If we could travel round the solar system with a thermometer, what would we find? The heat of the sun would burn us up, thermometer and all, before we got many more million miles nearer to

it than we are now. Jupiter, the largest of the planets, is like melted steel, fluid and glowing. Our own earth, however, is cold on the surface and hot inside. Now and again the heat inside shows itself in the eruptions of volcanoes, like Vesuvius.



Jupiter, the largest of the planets. It is still very hot. The dark spot on the picture is the shadow of one of Jupiter's moon-children.

The moon shows nothing but bare rock on its surface. Just as Jupiter is too hot for anything to live on it, so the moon is too cold.

All this may be an old story to you, but I tell

you it again because I want to "mention" the curious steps-and-stairs from very hot to very cold. Why should the central sun be so terrifically hot, the big planet so very hot, the small planet (like the earth) cold outside and hot on the inside only, and the small moon much colder still?

The reason is, of course, that the sun and planets were once much hotter than they are now. For millions and millions of years they have been cooling down. The sun is still blazing hot, partly because it is so huge and partly for other reasons, such as that it has been shrinking. Jupiter is about half-way in heat between the sun and the earth. Not being so big as the sun, or so hot at first, Jupiter has cooled off to a kind of red-hot ball. The earth, being smaller still, has frozen solid on the outside. It has a cold face and a hot heart. And the moon, being even yet smaller, seems to have frozen right through.

If you are late for breakfast in the morning, you find that your porridge has gone cold all round the edges of the plate. In the middle the porridge is warmer than at the outside. Your little brother, who gets a smaller plateful than you do, will find his porridge cold almost all the way through. His helping is like the moon, except that the moon is very much colder than the coldest plateful of cold porridge. You remember the nursery rhyme:—

The Man in the Moon
Came down too soon,
And found his way to Norwich,

He went down south
And burned his mouth
By eating cold plum porridge.

So you see that things on the moon are so very *very* cold that cold plum porridge is hot enough to burn the mouth of the Man in the Moon!

HOW OLD IS THE MOON?

One of Charles Darwin's sons—Sir George H. Darwin—spent many years trying to find out when and how the moon had been flung off from the earth, like a drop of water from a whirling umbrella. His notion is that the moon must be between 500 million and 1,000 million years old—quite a good old age for one of the baby members of the solar system family!

Later on I shall have something more to say about the age of the moon's mother—the earth. What I want to tell you about just now is the “how” and the “when” of things.

If the earth was very much hotter when it flung off the moon, what must the sun have been when the planets were young? The planets are, of course, older than their moons, just as mothers are older than their children. When the planets were still in their childhood they must have been ever so much hotter than they are now, because they had not begun to cool; and the sun itself must have been ever so much hotter. When we look back at the sun of these far distant times when the planets



A NEBULA, or Shining Cloud in the Star World. Note how the nebula is shaped like a great Catherine wheel, with a bright "sun" in the centre and "planets" forming on the spokes of the wheel. Nebulae like this tell us how our sun and its planets (with the earth) were made. From a photograph by the late Dr. W. E. Wilson, D.Sc., F.R.S

were born, we see something which was just as terrifically hotter than the sun of to-day as the sun is now hotter than our earth.

I am not going to ask you to imagine what the sun was like before then. I am going to tell you how you can *see* what it was like!

SUNS AMONG THE STARS.

Look up to the sky on a clear night, and you will see the wonderful, the beautiful belt of stars called "The Milky Way." If you could look through a big telescope at the part of the sky away from the milky way, you would see some curious fluffy things that look just like bright clouds. They are called *nebulæ*, from the Latin word meaning cloud. Some of these *nebulæ* are shapeless clouds of gas, but some look like Catherine wheels; and others are rings. Many have thick patches among the cloud, like raisins in a pudding. These patches are stars which have been shaped from the cloud as it cooled.

Nebulæ, like stars, shine by their own light. They are huge clouds of filmy light. And when the Catherine wheel ones are looked at through the spectroscope *they are seen to contain elements which are found in the sun.*

Once upon a time our sun was just like one of these *nebulæ*.

I would like to tell you a lot about how the nebula became like a Catherine wheel with the sun in the centre, and how one by one the planets

were shaped from the curved "spokes" of the wheel. But it is a long story, and not an easy one. When you are older you will be able to read it in books on astronomy, and understand how wonderful it was.

All the same, I think you are old enough to be amazed at the thought that this earth of ours, that seems so solid and so firm, was once part of a huge floating nebula. Jupiter, Saturn, Venus, Mars, and all the other planets, and the great sun itself, were also part of this filmy-looking stuff.

So the answer to the question, "How was the earth made?" is that the earth was made, like the sun and the planets, out of an enormous nebula that whirled in space millions and millions and millions of years ago. As it whirled and whirled the planets were formed out of it, and the thick centre part became the sun.

WHAT COMETS TELL US.

Before I go on to the next chapter, which tells more about what happened to the earth after it became a ball, I would like to mention something which tells us more about the wonders of the sky.

In olden times, when comets appeared in the sky, people used to get terribly frightened. They could not understand why these strange shining things came into view, grew brighter and brighter, and then began to fade out of sight. They thought that comets were a warning of something dreadful

about to happen; and if anything dreadful did happen they said that "the coming of the comet foretold the disaster."

Now we know that comets are just wisps of star-stuff. They come towards the sun from ever so far away, and then go away again on their long



Photograph of the Great Comet which appeared in the year 1882. People used to be terrified at the sight of comets before they knew that they were wisps of star-stuff.

journey. Astronomers can tell us when some of them will come back again.

Comets are certainly very wonderful things, but we are not afraid of them now. Indeed, we are

apt to laugh at the people who were scared by the sight of a piece of starry fluff in the sky.

ANOTHER GLANCE BACK.

Here are some little reminders about this chapter on "How was the World Made?":—

In olden times people used to think that the earth was flat, with the sky shaped like a dome above it.

Savages and other ignorant people think the same thing to-day.

In Honolulu the natives have a legend that the world was made out of a "gourd calabash."

In ancient Babylon the people believed that the world was made out of nothing in six days.

They thought, too, that the sun went round the earth.

Now we know that the earth is one of several planets that circle round the sun.

Many millions of years ago, when it was much hotter than it is to-day, the earth flung off the moon.

Other planets have their moon-children.

In much the same way, planets are the children of the sun. The "solar system" is one great family.

In the beginning the sun and planets were a glowing cloud like one of the "nebulae" which can be seen through a big telescope.

CHAPTER III

WHERE DID THE PLANTS AND ANIMALS COME FROM ?

WHERE did the plants and animals come from ? One answer to this question has already been given in the chapter you have just read. The ancient story of the Creation, handed down to us in the Bible, tells us that on the fifth day the fishes and birds were made, and that on the sixth day "God made the beast of the earth after his kind, and cattle after their kind, and everything that creepeth upon the earth after his kind." On the sixth day, also, God made man.

You will find this story in the first chapter of Genesis. But if you look at the second chapter of Genesis you will find a different story.

In the second chapter we are told that man was made first of all, and then that "out of the ground the Lord God formed every beast of the field and every fowl of the air." Nothing is said in this chapter about fishes.

Because the one story does not quite agree with the other we can see that in those old days people were not quite sure which was right. They did not know whether the first man came before or after the first animals.

There was another thing that people did not know when the Bible story was written down many hundreds of years ago. Read further down in the second chapter of Genesis, and you will learn that the Lord God brought every beast of the field and every fowl of the air to Adam (the "first man") to see what he would call them. The story goes on :—

"And whatsoever Adam called every living creature, that was the name thereof. And Adam gave names to all cattle, and to the fowl of the air, and to every beast of the field."

ANIMALS BEFORE ADAM.

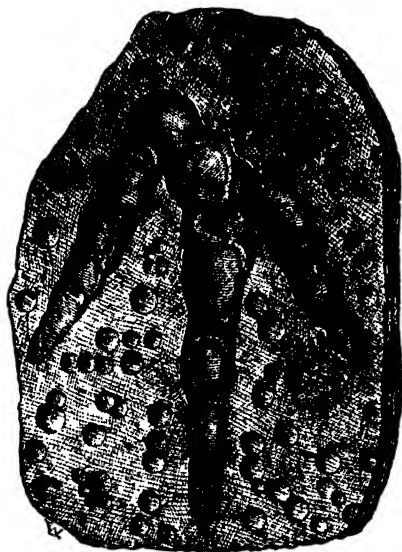
I am sure that those who wrote this story would have been surprised to find that ever so many different kinds of beasts and birds had lived and died millions of years before the first man came into the world. These animals had gone for ever from the face of the earth—a great host of strange reptiles and birds, along with a wonderful crowd of swimming fish and shell fish and ferns and trees.

Supposing you told this to the Babylonian boy who had come to life again and had become your schoolmate, he would very likely ask you: "How do you know?" Perhaps you will ask me the same question: "How do I know?"

Well, I know about these animals that lived "once upon a time" just in the same way as Robinson Crusoe knew, by the footprint on the

said, that he was not the only man on his island. It was a man's footprint, but it was not the same size as his own. So he was sure that another man had been there.

Some of the beasts that used to live in these



A Page from the Stone Books. Footprint of an animal and marks of rain-drops found on a slab of stone which was once mud.

far-off times have left their footprints for us to see—real “footprints in the sands of time.” These footprints are found when we dig into the rocks beneath our feet. They are quite different from the footprints of any animals ever seen by men. And

alongside the footprints we sometimes find the marks of raindrops.

Footprints and rain-marks millions of years old! That seems too wonderful to be true. But it is really quite easy to see how they came to be preserved all that long time.

Think of an animal walking along a mud bank in the rain—grumbling, perhaps, at getting his skin wet. His feet sink in the wet mud and leave a deep mark. Then out comes the sun and bakes the mud hard. Then the tide rises or the river is flooded and brings down a lot of mud to cover the marks right over. By-and-by more mud gathers, until the old footprint is buried deep. Years and years go on, and the mud becomes hardened into rock. And years and years afterwards men come with crowbars and pickaxes and dynamite to break up the rock so as to get stones for building their houses. They split off a layer of rock, and come upon the footprints and the raindrops.

If that does not prove to your Babylonian friend that strange animals lived in the times when our rocks were banks of mud, you can take him to the Natural History Museum in London and make him say how-do-you-do to the skeleton of the *Diplodocus*. *Diplodocus* is a long name, but not nearly so long as the beast himself. From the tip of his nose to the tip of his tail he measures eighty feet. It will take you quite a little while to walk round him. He is like a huge dragon without wings.

The skeleton of the *Diplodocus* was found buried



A full-sized model of the *Diplodocus* as he very likely appeared in real life millions of years ago.

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deep in the rocks of America. It had lain there for millions of years.

In other rocks we find the remains of ancient shell-fish, of fishes that wore armour, of many reptiles with wings, of strange birds with teeth. Museums have been filled with these remains, which are called "fossils."

In your fairy-tale books you sometimes read about dragons and other queer fanciful beasts. Yet no fairy-tale beast is so queer as the real beasts that roamed about the earth once upon a time and left their footprints or their bones for somebody to write books about, millions of years after they were dead.

WHEN FOSSILS WERE ALIVE.

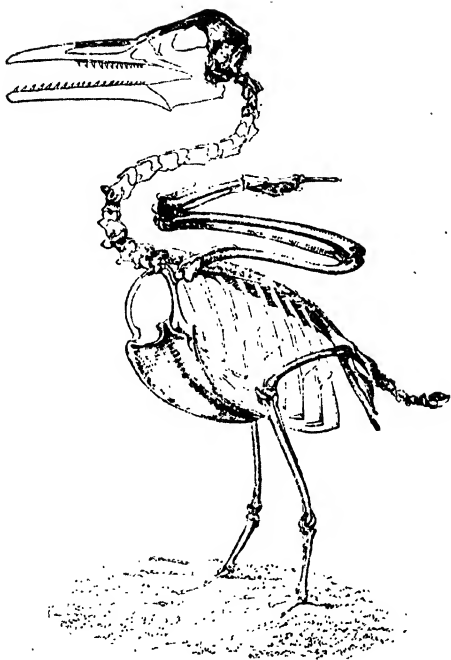
Now, you may say that: "This is all very well. But how do we know that men did not live at the same time as these queer old beasts? How do we know that little boys and girls did not live when fossils were alive, catching the armoured fishes, making a pet of the Diplodocus, and going for rides on the backs of the flying reptiles?"

Well, if they did, they must have had a very exciting time of it. I believe the Diplodocus may have been a very mild old thing, like a cow, because it was too big to move fast and it had teeth which were no good for anything else than munching grass. But fishes with bony armour and sharp teeth could not have been caught with a string and a worm on a bent pin! And there could not have

been much fun in collecting eggs from the nests of toothed birds, with the chance of being carried off by a reptile on the way for his Sunday dinner. The world in those days must have been like a big Zoological Garden, with all the animals let loose.

But suppose that men and women did actually make their homes in the Fossil Zoo! Surely their footmarks would have been found somewhere on the mud-banks? Surely their bones would have been discovered somewhere among the thousands and thousands of fossil skeletons? They must have left something behind them to let us know that they were there. Yet you can search through all the museums, and look at all the pictures in books about the older fossils, without finding any sign of men and women. Every year new fossils are discovered in the rocks, but they are all fossils of animals or plants. Not so much as a single human tooth in all that great crowd!

In the next chapter but one I shall tell you about the first signs of men and women on the earth. These signs are found close to the surface of the ground. When we dig beneath the surface we come to rocks which contain no sign at all of men and women. So we are pretty certain that the armoured fishes and the toothed birds and the flying reptiles, and all the other old living things that became fossils in rocks, had the world quite to themselves in their day.



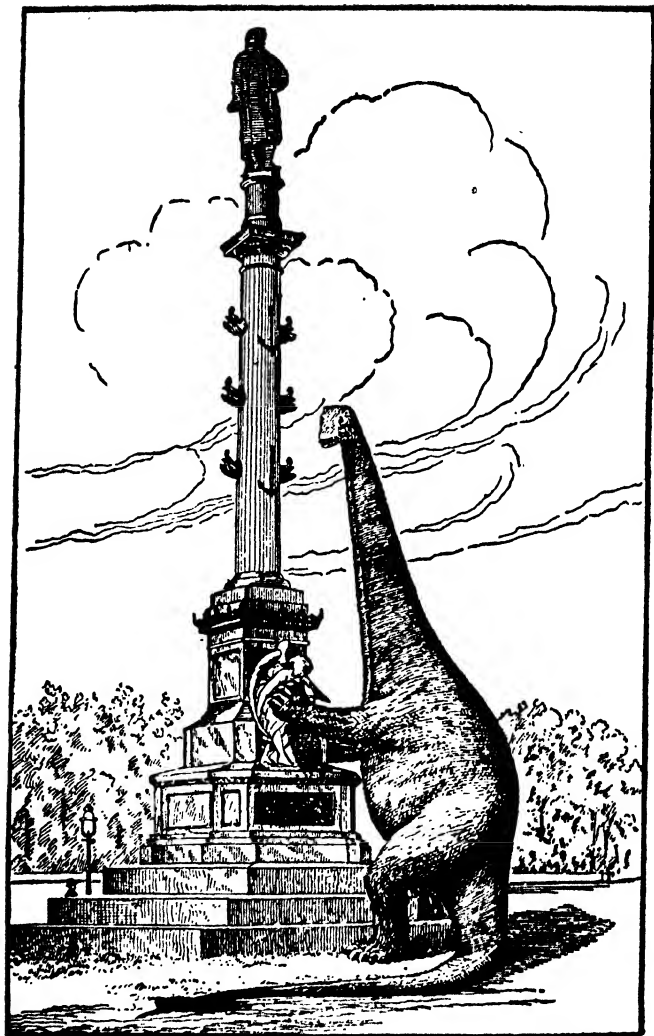
The skeleton of one of the birds, with teeth, that lived many millions of years ago

A REAL FAIRYLAND.

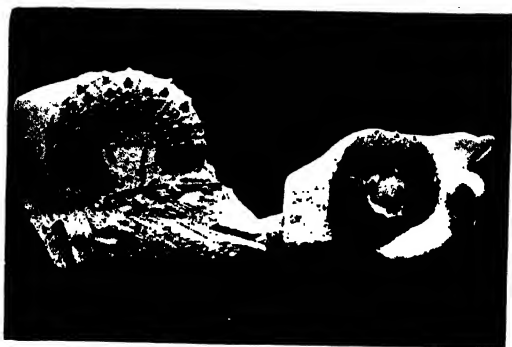
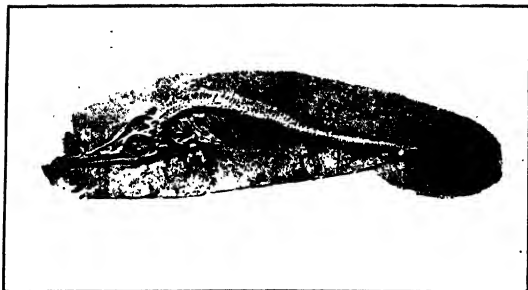
Do you still read fairy tales? Perhaps you are getting a little too "grown-up" to read them as often as you used to do; but I hope you are still able to enjoy a really good one. All the same, I would be very much surprised to find that you have day-dreams about fairies, like some children who are not old enough to read anything else. These happy children live in fairyland. When they walk through a wood they see fairies peeping at them round the trunks of trees; they hear goblins rustling through the long grass; they fancy that gnomes watch them from rabbit-holes. Every gamekeeper's hut is the home of a witch; and every cave hides an ogre.

If all these things were true, they would be very wonderful, would they not? Everybody, I suppose, would like to go and live in fairyland. Yet the real world is every bit as wonderful, although swans do not change to princesses at the wave of a silver wand.

Away down beneath the house you live in, beneath the street you walk along to school, beneath the hills that look as if they had stood there since the beginning of the world, lie buried the relics of many lands and seas once full of living things. Great lakes were there, swarming with ugly fish. Oceans were there, their beds teeming with strange and beautiful shell-fish. Or tropical swamps were there, covered with giant ferns and haunted by weird animals that lived partly in water and partly on land. These forests



The Brontosaurus, one of the giant reptiles of millions of years ago, showing its size in comparison with a large monument.



These pictures show how fossils are found. The top one is a photograph of the bones of an Ichthyosaurus (a swimming reptile), preserved in stone. The Ichthyosaurus has a long name, but it was much longer—sometimes more than twenty feet. The picture is ever so much smaller than the fossil itself, which is in the Geological Museum in London. The lower picture shows a fossil sea-urchin, with even its spines preserved in rock.

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went to make the coal seams, many of them now hundreds of feet below the ground. On lands now hidden floundered huge reptiles, some as heavy as a traction engine; on others lived a host of animals that look like fancy beasts made out of a bit of an elephant, a bit of a rhinoceros, or some other creature you see in the Zoo.

If I had a magic wand, I would bring all these animals to life again, and make up a procession of them for the Lord Mayor Show. It would be a Show! Some of the beasts would frighten people out of their wits; others would make us roar with laughter. One trouble about the Fossil Procession would be that it must take days and days to pass—there are so many of these vanished beasts. Noah certainly could not have got two of each kind into his ark. The Diplodocus and his wife would have needed an ark to themselves.

THE KING AND THE APPLE DUMPLING.

I wonder if you have heard the story of "The King and the Apple Dumpling"? I am not quite sure that it is a true story; but even if it were made-up, it is worth telling. This King—one of the Georges who reigned in the early part of last century—was very much puzzled over an apple dumpling when he saw it for the first time. "How," he asked, "did the apple get inside the dumpling?"

Of course, you will say that this was a silly question. You and I have seen dumplings made,

and we know that the paste is wrapped round the apple, and does not get hard until it is baked. But if, like the King, we had never seen dumplings made, or even seen any cooking being done, we might not be so very stupid if we wondered how the apple came to be inside a hard ball of crusty paste.

At any rate, there is nothing stupid in asking: "How did the fossils get inside the rocks?" Here you have the fossil bones of animals locked away in stone that is hard enough to use in building houses. Deep shafts have to be dug through solid rock to fetch up the coal which was once a forest growing on a swamp that steamed under the heat of the sun. How did these animals, which once lived in the open air, find their graves in the depths of the earth? How did these forests come to be buried so deep?

The old King would have cleared up the dumpling puzzle if he had gone into the kitchen and watched a dumpling being made. We can explain the fossil puzzle by finding out a little more than we did in the last chapter about how the earth was made.

WHEN THE ROCKS FROZE.

Let us jump back 500 million years, to the time when the moon had just been born. Nothing was alive on the earth at that time, you may be sure. Even a salamander—which is supposed to be able to stand fire—would have been toasted to a cinder. The earth was probably a red-hot molten ball.

By-and-by, as the earth went on cooling, the rocks

began to freeze. It seems funny to talk about rocks freezing, but when you remember that rocks can be melted if they are made hot enough, and that water is just melted ice, you will see that rocks can freeze as well as water. A crust of rock formed over the molten earth, like a skin of ice on water. Every now and again, however, the molten stuff would bubble up, like a pot boiling over, and break the crust. It took a long, long time before the crust was thick and hard enough to keep the pot from boiling over.

Even to this day, however, the heat that is shut away inside the earth finds a way of getting out. It bubbles up, as I told you before, through volcanoes, throwing out streams of melted rock and blowing off steam. When volcanoes are busy the earth trembles as the lid of a saucepan trembles when the water in the saucepan is boiling over. After a big volcanic eruption the land near the volcano may be a little higher or a little lower than it was before the eruption.

Another thing that tells us that the crust of the earth is not "fixed" is the earthquake. During an earthquake shock the ground quivers and twists; sometimes it splits open. And apart from these sudden earthquakes, that frighten people out of thinking that the earth is "solid," it has been found that some parts of the land are slowly rising and others slowly falling. Perhaps it may be only an inch or two in a hundred years, but all the same it *moves*.

If ever you are lucky enough to spend your

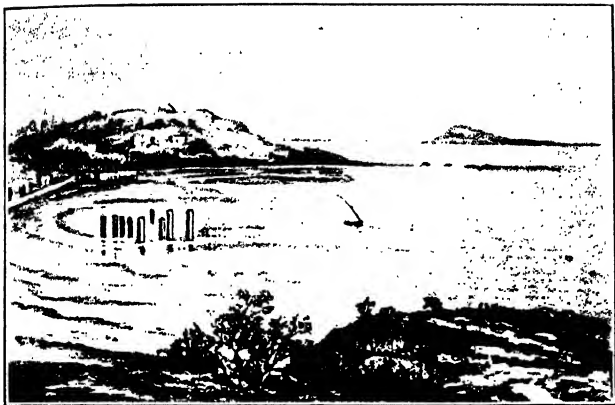
holidays at a seaside place in Scotland, you will perhaps notice that the town itself is built on a flat strip of ground between the hills and the sea. When you dig down into this ground you find gravel and sand, just as you find them on the sea-shore. This flat strip, indeed, used to be the sea-shore until a movement of the crust of the earth lifted it well above the sea. That is why it is called a "raised beach."

Now, we may be sure that when the crust was very thin and the earth hotter than it is now, the volcanoes were very busy, earthquakes happened every day, and the land rose or fell much more easily than it does now. When a part of the crust was heaved up it became a continent. When a part was allowed to sink it became an ocean. With all this wobbling going on, places that were once on the hill-tops would be under the water at another time, and what was the bottom of the sea at one period would be raised until it formed a mountain at another period.

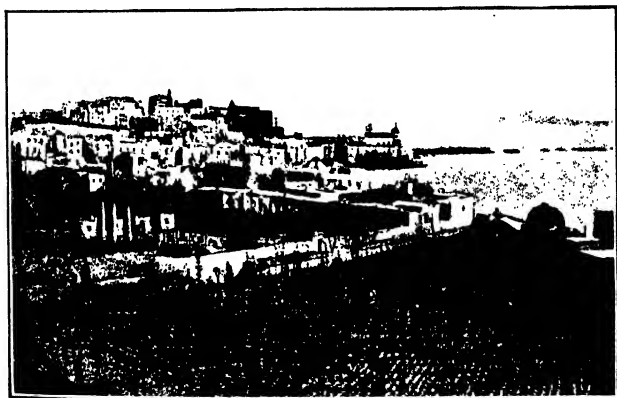
Perhaps you are beginning to see how the fossils got inside the rocks! But we may as well find out exactly how it came about.

WATCHING FOSSILS BEING MADE.

Let us go back to the time of our old friend the *Diplodocus*, and stand near the mouth of a great river in flood. The water is all muddy, which means that it is carrying down to the sea a lot



POZZUOLI (Italy) in the ninth century, showing the pillars of an ancient Roman temple then partly under water owing to the land having sunk.



POZZUOLI as it is to-day. The land has risen, and the pillars of the temple are on dry ground well above the sea on a "raised beach." These pictures show how the level of the land rises and falls.

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of clay and sand that has been washed down into the river from the hills. When the river meets the sea it has to go slower, and then the clay and sand settle to the bottom, making what is called a mud-bank or a sand-bank. Some rivers, like the Nile, are almost choked up with the banks of sand and clay. You will read in the geography books about the great "delta" of the Nile; this delta is just a collection of the sand and clay washed down from the land by the Nile.

But if you watch the river closely you will see something else than clay and sand being carried along. Leaves and tufts of grass are whirled past. Now and again the branch of a tree floats by. Then we may see the body of some poor beast which has been drowned in the flood. All these odds and ends—the leaves, the grass, the branches, the animals—get stuck in the mud-banks. When the tide is low all sorts of beasts wander over the banks, leaving their footmarks. You can imagine *Diplodocus* taking a stroll and getting caught by the tide, because he was very likely a stupid as well as a slow beast. His body will sink deep in the mud, in among the sea-shells and the skeletons of fishes that have died.

Next time the river is in flood another lot of clay and sand comes down and covers everything up. The *Diplodocus* is decently buried, along with a nice collection of shells and fish-bones and bits of plants. The mud-bank has become a Natural History Museum!

Suppose, now, that the land in this part of the world is slowly sinking. What happens? The river goes on carrying down more sand and clay, making the mudbanks thicker and thicker. The mud at the bottom of the bank has to bear the weight of all the mud on the top of it. If the land goes on sinking, the mudbanks will grow and grow until they are perhaps a mile thick. By that time the mud at the bottom will be squeezed into solid rock. The sandy parts are changed into sandstone, and the clayey parts are changed into slate.

Perhaps it will seem queer to you that rocks could be made out of mud. But it will not seem so queer when you learn how easy it is to make mud out of rocks.

PLAYING AT SHOPS.

When I was a boy at school we used to do all our dictation and all our sums on a slate, writing with a slate pencil. Sometimes I used to amuse myself by pouring a few drops of water on the slate and rubbing the wet part hard with the slate pencil. After a while I had made a real *mud puddle* on the slate. I had changed the hard slate into soft mud.

Often, too, we used to play at shops with pieces of white sandstone and red sandstone. We would take a little piece of sandstone and break it up with a hammer, pounding away until we had made a pile of *sand*. The white stone made what we

called "salt," and the red stone made what we called "pepper." We were very young when we played this game—much too young to know that we were doing the opposite of what Nature had done when it changed the sand into sandstone. When I was older, and began to learn about rocks, it was easy for me to understand that sandstone was just stone made out of sand.

But we have not done yet with our Natural History Museum that was once a mudbank. It has become a great thick slice of rock under the sea. By-and-by, instead of sinking it begins to rise. Slowly it appears out of the sea until it becomes a piece of land—high and dry.

Now the museum is ready to be "opened for public inspection." How is it opened? How do we get at the fossils that lie buried deep inside it?

Men, of course, "quarry" into the earth to find stone for building. But quarries are only like one or two little mouse-nibbles on a huge lump of cheese. There are not enough of them, and they do not go deep enough.

NIBBLING AT THE EARTH.

Suppose, though, that you had a thousand mice nibbling at the big lump of cheese. They would soon eat it all up—little by little and bit by bit. This is very much what happens to the fossil museum. The poor old earth has all sorts of things nibbling at it.

Every wave that breaks on the shore takes a nibble, washing away more sand or shingle. The "White Cliffs of Old England" near Dover seem everlasting; but after a storm it often happens that large pieces of the cliffs fall into the sea. These cliffs are made of chalk, and you can tell that the sea has been nibbling at them because the water gets white with chalk-mud.

Jack Frost nibbles at the land whenever he gets a chance. He freezes the roads and fields hard, and when the thaw comes it makes them ever so soft. Even rocks crumble away when they are frozen and then thawed.

The sunshine nibbles too. It dries the surface of the land, making dust which is swept away by every puff of wind.

The rain nibbles most of all. Every heavy fall of rain makes the rivers muddy. Tiny streams run down the hillsides to make bigger streams; and these join together to make rivers. A river, with its tributaries, is just like a lot of gutters, down which mud and stones are washed away. These gutters, or valleys, are always getting deeper because the water is always carrying stuff from the land to the sea. Sometimes a river cuts a deep channel with steep sides right through the rocks, like the Grand Cañon of Colorado. More often the channel is a broad open hollow, like the valley of the Thames or the Clyde. One way or another, the water eats its way down and down, until the fossils that once lay buried are uncovered.

It was on the banks of a little river in Scotland that Hugh Miller found the fossils of what are called the Old Red Sandstone Fishes. When I visited this river many years ago, all the fossils had disappeared. Men had nibbled away at the rocks with hammers until not a single fossil was left. That part of the "museum" had been opened by the river, and all the specimens taken away by men.

THE STONE BOOKS OF THE EARTH.

You remember about the Stone Books of old Babylon, which were found under the sands of the desert?

The rocks are the stone books of the earth. The animals and plants have written their own story in these books. They have written it in portraits of themselves. Some of the portraits are very sketchy—just a piece of bone, or the print of a leaf; but they tell us quite a lot about the living things that swarmed in sea and on land long, long ago.

Many men have spent their lives studying the Stone Books of the Earth. And one of the first things they found out was that some rocks are older than others. The pages of the Stone Books are not numbered like the pages of this book, but from various signs men can tell that some belong to the early part of the story and some to the late part. The Old Red Sandstone Fishes lived long before the *Diplodocus*, and all the *Diplodocuses* were dead and gone before we come on the fossils

of animals like the horse; and these were older than fossils of men.

This is the most curious thing about the Stone Books of the Earth—only the very last pages tell us anything about the animal we call “man.” There were millions and millions of beasts and birds and fishes that Adam and Eve never saw. And these animals were not created all at once. Different kinds came on to the earth one after another. Each page of the Stone Story has its special kind of pictures, sometimes rather like the pictures on another page, but always different in one way or another.

So you see it is not an easy thing to answer the question, “Where did the plants and the animals come from?” To answer the question I would need to tell you all about a plant and animal procession that lasted millions and millions of years! All I have been able to tell you in one chapter is a little about the plants and animals that lived before the days of Adam and Eve.

In the next chapter I shall explain how different kinds of beasts come to belong to the same family—indeed, how all living things are just one great family. But before you can see through that puzzle you must remember the lessons of the Stone Books of the Earth.

THE LESSON OF THE STONE BOOKS.

Many different kinds of animals and plants lived and died millions of years before man came into the world.

Lots of these long-dead creatures have left their remains in the rocks.

These remains are called "fossils."

The rocks beneath our feet are full of fossil beasts and fishes and plants.

The fossils are found inside the rocks because the places where they once lived were covered over with sand or clay which was later squeezed into solid stone.

The moving of the crust of the earth has lifted rocks from the bed of the sea until they rose as high as mountains.

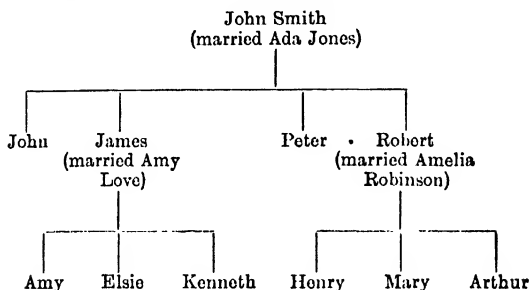
Some of the rocks are older than others.

In the older pages of the Stone Books there are no pictures of human beings.

CHAPTER IV

NATURE'S FAMILY TREES

HAVE you ever seen a Family Tree? It grows upside down, something like this:—



This is the Smith Family Tree. It means that John Smith married Ada Jones; that they had four children—John, James, Peter, and Robert; that James and Robert married and had three children each—Amy, Elsie, and Kenneth; Henry, Mary, and Arthur. When these children grow up, get married, and have children of their own the tree will get bigger. And it would also be bigger if we put in the first John Smith's father, and *his* father, and so on, away back for ever so long.

The Family Tree is only a kind of picture showing how brothers and sisters and uncles and aunts

and fathers and grandfathers are related to each other. Some people say that they can build their Family Tree right back to ancestors who came over to this country with William the Conqueror—in the year 1066. Perhaps they can do as they say; but, after all, *every* family is a very old one! We are all descended, are we not, from Adam and Eve?

A FAMILY LIKENESS.

Now I want you to think of some big family you know—some family with lots of children, and aunts and uncles, with grandpapa and grandmamma as well. You know all the children by sight. You can tell the difference between Robert and John, and between Elsie and Mary. All the same, Robert is a little like John, and both Robert and John are a little like their father or their mother. Again, Elsie may have eyes just like her grandmother's, and Mary may have a habit of turning in one foot, just like her Aunt Clara.

That is the sort of thing we call a "family likeness." Sometimes the family likeness is so close that brothers are mistaken for each other. It comes out in all sorts of funny ways. Perhaps a big nose "runs in the family." Or red hair.

The headmaster of a school I used to go to had two sons. All three used to walk down to school together—the father in the middle, one son on his right, and the other on his left. One day, when I happened to be walking behind them, I noticed that

the father had a queer way of rolling his head a little from side to side. The elder son did the same. The younger did the same. There they were, all three, keeping step and swinging 'their heads in time with each other. That swing of the head was part of their family likeness.

So you see how it is that members of one family are like each other, yet different. The same can be said of the great big families we call "races," like the French, or the Spaniards, or the Chinese. No two Chinamen are exactly alike; but when you see a man with a flat yellow face and almond-shaped eyes you say: "Here is a Chinaman." There are millions of Chinamen with the same sort of face and eyes. They belong to one "family" or race.

Now let us look at all the races together—the white men, the yellow men, the red Indians, and the black men. We call them all MEN. Why? Because they have a kind of family likeness to each other. They are much more like each other than they are like monkeys. They all walk on two legs; they all have smooth bodies with hair on the head and face; they can all use tools (which no monkey or other animal can do); they can all speak some language. These are some of the things that help us to say that they are "men."

If you had a sheet of paper as big as the Pacific Ocean, and wrote with a pencil as fine as a needle, you might find room enough to draw up the Family Tree of the human race. Adam and Eve would be at the top, and all the different kinds of human

beings at the bottom. That would make such a fine big tree that it would take you a few thousand years to write it all out !

By this time, I expect, you are wondering what the Adam and Eve Family Tree has to do with the question, "Where did the plants and animals come from?" I seem to have got on to something quite different. But in a little while you will see that our little talk about Chinamen and Red Indians belongs to this chapter all right.

Suppose we could write out the Family Tree of an animal like the pigeon. A Family Tree of that kind would tell us about where the pigeon came from.

Before I say any more about pigeons I want you to think how strange it is that people who look so different as Negroes, Chinamen, Indians (red and black), Spaniards, Eskimos, and Englishmen should all belong to the same family. The Negro and the Eskimo are cousins ! Yet the negro looks so different from white men, and is so different from them, that the white men once thought they were quite right in buying and selling negroes as slaves. The negroes, in fact, were treated just like animals—only worse.

I often wonder what our greatest-grandfather Adam would say if he came to life again and went round the world to visit his family. He would get a big surprise to see what a mixed lot they had become. Nobody knows whether Adam was a black man or a white man ; but if he were a white man he would be almost sure to say that the Yellow

Chinaman, the Red Indian, the Brown Hindoo, and the Black African could not be his children. He would be almost as upset as the hen that hatched a duckling along with her chickens and cackled with terror when the duckling waddled into the pond.

You can hear Adam saying, "Dear me, how they have changed!"

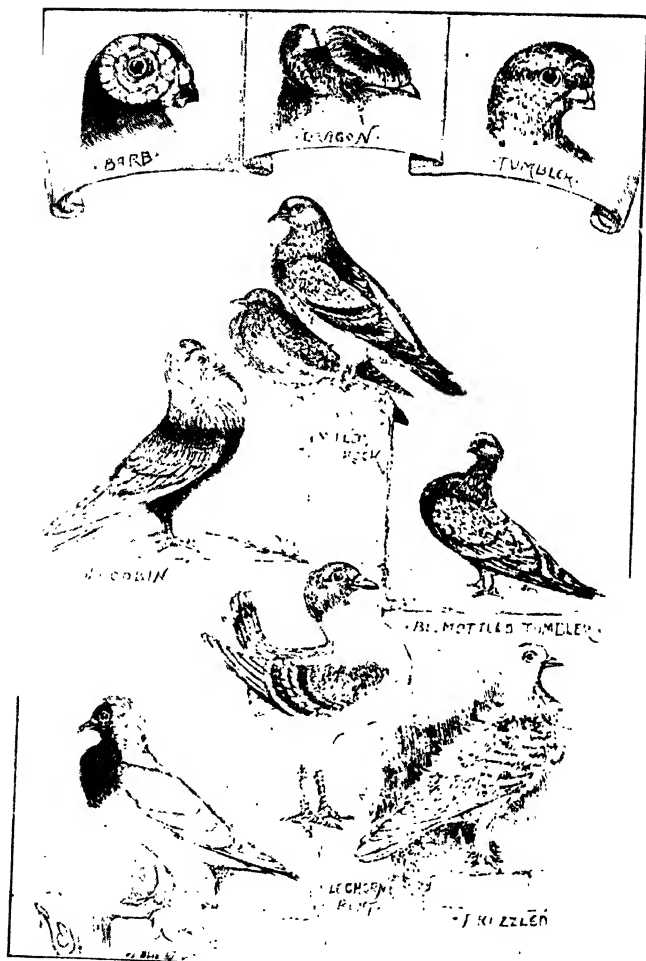
That is the secret of plants and animals as well as of the human family. "How they *have* changed!"

HOW ANIMALS AND PLANTS CHANGE.

Now I expect you have always thought of an animal or a plant as something that never changes. Puppies, you will say, grow up into dogs just like the old dogs. Acorns grow up into oaks that are exactly like what oaks have always been. That seems quite certain sure, doesn't it? And you may tell me that it is all very well to talk about Adam's children becoming so different as Negroes and Eskimos. People, you will say, are not just animals. They are different, and *they* may change, while dogs and lions and tigers and other animals keep to the same pattern over and over again.

What I have to do now is to let you see that animals and plants do change. And I am going to do it with the help of animals and plants that you are sure to know something about.

Do you keep pigeons? If you do not, perhaps



THE PIGEON FAMILY.—The wild Rock Pigeon perched on the pillar in the centre of this picture is the great grandfather of all the other breeds of pigeons shown here and in the picture facing page 75.

To face p. 71.

one of your friends does. In any case, I am sure you have seen them flying about. There are different kinds or "breeds" of pigeons, and some of them are so queer that they look quite a different kind of bird from any of the other pigeons. Think of the Pouter, which has such a funny way of blowing out his chest until it is as big as if he had swallowed a tennis ball. Think of the Fan-tail, which struts around with his tail-feathers spread out like those of a peacock. Think of the Jacobin, with its pretty hood of turned-up feathers.

Then there is the Tumbler, which does not *look* so very different from the ordinary pigeon, but has a habit of turning somersaults as it flies. And there is the Homing or Carrier pigeon, which is famous for being able to find its way back to the dovecot from places miles and miles away. When the war broke out between Great Britain and Germany, nobody in Great Britain was allowed to keep homing pigeons, in case they might be used by German spies to carry messages.

There are other kinds of pigeons, but I have named enough to show you what a mixed lot of birds we call by the name of "pigeon."

Charles Darwin, the great man I told you about in the first chapter, made a careful study of pigeons. He wanted to find out where the pigeons came from. And he found that all of these strange breeds—the Pouter, the Fan-tail, the Jacobin, the Tumbler, the Carrier, and all the rest of them—had come from the wild rock pigeon. They all were the children

of the wild rock pigeon, just as the Chinaman, the Eskimo, the Negro, and other men were children of the first man and woman.

If, the wild rock pigeon were to visit a dovecot and see all the breeds of pigeons flying around, it would certainly say: "Dear me, how they have changed!"

Then, again, look at all the different kinds of dogs. Go to a big Dog Show, and you will see tiny Pekinese that you can hold in your little hands, and St. Bernards big enough for you to ride on. You will see Dachshunds with sausage-bodies and short crooked legs, and Greyhounds with narrow bodies and long thin legs. You will see Pugs and Collies, Fox Terriers and Bull-dogs, Sheep-dogs, Scotch Terriers, Irish Terriers, Yorkshire Terriers, Spaniels, Retrievers, Setters, and a whole crowd of lap-dogs that look more like rats or guinea-pigs than dogs. They are more mixed even than pigeons, but they are all dogs, and they have all come from the wild dog that used to trot behind savage men when they went hunting.

Now that I have spoken about two kinds of animal that are so different, although they are "all one family," you will be able to think of others. Cats, rabbits, canaries, guinea-pigs, horses, cows, hens, ducks—these are some that everybody knows about. Each one of them has different kinds of breeds. And when you go to the Zoological Gardens, you will find that there are different kinds of tigers, lions, deer, monkeys, parrots, elephants, and all

other wild animals, just the same as with the tame animals. Later on we shall find out that all the different kinds of tiger have come from one kind of tiger ; and so on for the other wild animals.

WHAT ABOUT PLANTS ?

But what about plants? Do different kinds of roses or sweet peas or apples come from the one kind of rose or sweet pea or apple? Well, if I were to start and write down all the different kinds of roses that grow in gardens, I would fill pages and pages of this book. There are so many of them that they are called after the names of people and places, like the "William Allan Richardson," the "Gloire de Dijon," the "Maréchal Niel," the "Snow Queen," the "La France," the "Liberty," the "Richmond," the "Lady Hillington," the "Lady Ashtoun," the "Betty," and so on. Yet all these roses, in every shade of yellow and red, with few petals and with many, have come from the wild rose that blooms so beautifully in our hedgerows.

Some of the new roses which "came into fashion" a few years ago were very like the wild rose itself. They had the same sort of open petals, though there were many more petals to each rose than in the wild rose.

The names of all the different kinds of sweet peas would make another long procession. Every year the procession gets longer, as new "varieties" are brought out. Yet, with all the changes of colour

and shape, every sweet pea reminds one of the sweet pea from which they all came.

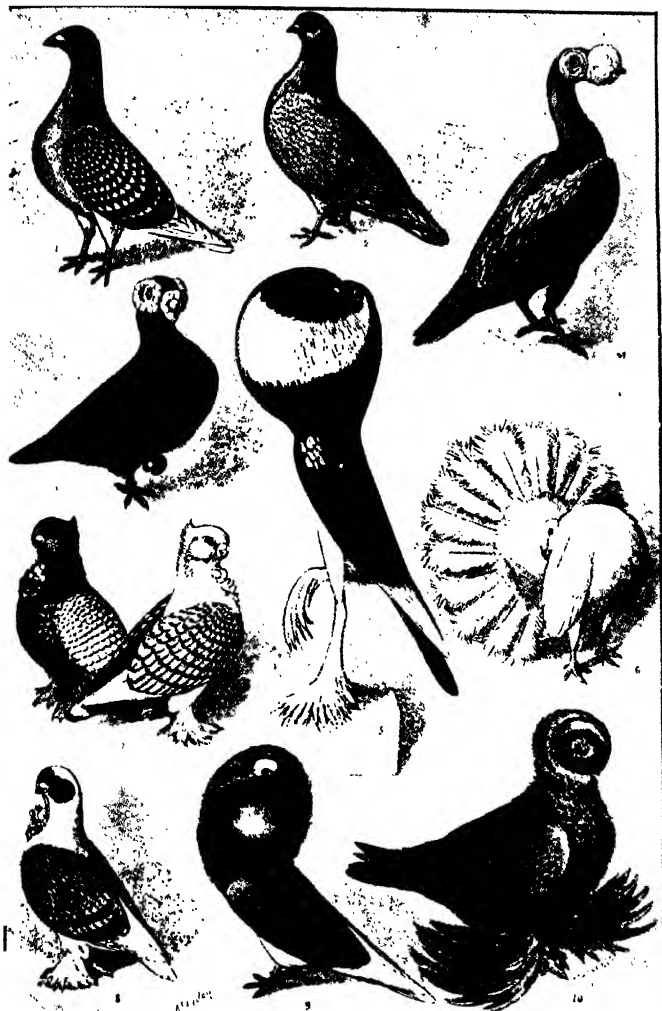
And as for apples—think of the rosy-cheeked ones, and the green ones, and the striped ones, and the brown ones! They are all different; but they are all apples, and all made in the same sort of way as the little wild apples that make you screw your face up with their sourness when you bite them.

HOW DO OLD ROSES CHANGE INTO NEW ROSES?

I could tell you the same sort of story about all sorts of flowers and fruits until you were tired out. But I expect you are already saying to yourself: "I know that all the garden roses came from the wild rose; but *how* did they do it? *How* does it come about that old roses change into new roses?"

This is not a question that can be answered in a hurry. For one thing, the roses did not change in a hurry. New roses are produced little by little and bit by bit. The beginning of the change was when the wild rose was planted in a garden and sheltered from the winds, watered regularly, fed with manure, and tended with as much care as a baby. It began to look a little different for the change—to show more petals, and perhaps to alter in colour.

Now, supposing a gardener finds a rose which has many big petals with a yellowish tinge in them. He likes this rose, and so he sets to work to grow a number of new rose-trees from it. Then he takes the yellowest and biggest roses from among



Some more of the breeds of pigeon which have come from the wild-rock pigeon shown in the picture facing page 71.

To face p 75.

the new trees, and makes new trees from them. When these new trees grow, he again chooses the yellowest and biggest, and grows more new trees. After he has done this many times, his roses have got bigger and yellower than ever, until they become like the lovely tea-rose.

Now let us go back to the pigeons and see how the same sort of step-by-step business will change the plain wild pigeon into a fancy pigeon like the fantail.

Let us suppose that a farmer tames some wild rock pigeons by giving them food and a comfortable house to nest in. They come and live with him, and bring up their baby pigeons in their new house. Then these children grow up, and have baby pigeons of their own; and this goes on until there is a great flock of pigeons.

All these pigeons will not be exactly alike, any more than the children you know are exactly like their brothers and sisters. Some will be a little different in colour, or they will have longer tail feathers, or will be more apt to turn head-over-heels as they fly. The farmer, if he is fond of his pigeons, will notice these differences. And he is also sure to notice that there are far too many pigeons for him to look after. So he makes pigeon-pie of the ones he does not like best, or gives them away to the neighbours. He keeps the ones he likes best.

Perhaps he keeps one or two pairs that have stand-up tail feathers. When these special ones lay eggs and rear children, some of these children will

have stand-up tail feathers just like father and mother. Next time the farmer kills or gives away the pigeons he does not want, he will keep the ones with the biggest show of stand-up tail feathers.

If he goes on repeating this time after time, always keeping the pigeons with the finest stand-up tails, he will come to have nothing in his dovecot except pigeons which will look like fan-tails. Then he will get more particular about his beautiful pigeons, and get rid of all that do not show perfect fan-like tails. So he will come to have nothing but the best fan-tails.

That was the way the wild pigeon changed into the Fan-tail. In the same sort of way, but along a different road, the wild pigeon changed into a Pouter. The breeder noticed that his pigeons had a habit of blowing out their throats as they cooed. He took a fancy to those that played that trick best, and he went on choosing the cleverest throat-blowers until he had got to the comical breed we call the Pouter.

Jacobins, Tumblers, Carriers, and the rest came into the world in much the same way. And if I were to tell you about the different breeds of dogs and cows and horses and other tame animals, it would be just the same kind of story all over again.

“ARTIFICIAL SELECTION.”

If you want a short answer to the question,
“Where did all the different garden plants and

tame animals come from?" it is that they came from weeds and wild animals. The short answer to the question, "How did they come from weeds and wild animals?" is that men *chose* only those of a special kind until nothing but the special kind was left.

To choose is to *select*, and this kind of choice is called *artificial selection*. These are two big words, but some children like big words. When anybody asks you how new kinds of garden plants or tame animals come into the world you will be able to say that it is by "artificial selection"! Here the word *artificial* means that men had a hand in the selection.

Now, I would like you to shut this book and close your eyes and think about what this all means. It means that men can, if they like, bring new kinds of plants and animals into the world.

But you will remember that men had nothing to do with all the plants and animals whose pictures are in the Fossil Books of Stone. These animals could not have come by way of artificial selection.

Again, you may be sharp enough to see that there are lots of living animals that men have never tamed as they have tamed pigeons or dogs; and lots of plants they do not trouble to grow in their gardens. What about these wild plants and animals? Where did they come from?

We have to find out some way of selection or choice without letting men have a finger in the pie.

“NATURAL SELECTION.”

Charles Darwin spent years and years in trying to answer these questions. His answer is given in a big book called *The Origin of Species*, which you will be able to read with delight when you are a few years older. I expect you would think it very difficult and “dry” if you began to read it now. I am going to tell you only a little bit of his answer, and I hope you will not find it either difficult or dry.

One thing you know about animals is that all the children of the same father and mother are not exactly alike. In spite of their strong family likeness, they differ a little among themselves. All the puppies in a litter are not exactly the same size or exactly the same colour. One may be more playful than the others, or more clever at learning tricks, or able to run faster when he grows up.

Now let us imagine a herd of animals something like the antelope, but not nearly so nimble or so keen-scented as the antelopes you see in the Zoo. And suppose that this herd had been living in a part of the country where there was plenty of food and not a single tiger or lion to chase them and eat them. It would not matter in the least to the herd if they all got fat and lazy and lost their power of scenting an enemy from afar. They would be quite safe, and they would go on having children and growing in numbers from generation to generation.

When the lions and tigers found out this valley,

with its crowd of nice fat tender animals, there would be a very quick change in the scene. The fattest and largest animals would be the first to be eaten up, because they would be too fat and lazy to run away. And the animals with a poor scent would also be among the first to go, because they would not sniff the enemy until he was right on them.

On the other hand, the animals with long legs and a keen scent would stand a much better chance. They would smell the lion or tiger miles away, and at once start to run up among the hills as fast as their legs would carry them. They would escape, and go on living, and having children like themselves.

After this sort of thing had gone on for a long time, the lions and tigers would have killed off all the slow and stupid animals, leaving the quick and clever ones. They would have changed a mixed herd of slow and quick, stupid and clever, animals into a herd of quick and clever ones. The children of these quick and clever ones would tend to be quick and clever like their parents. And any of these children who were not so quick and clever as the others would be the first to be caught and killed, leaving the quickest and cleverest to have children as quick and as clever as themselves.

So you see that the herd would slowly change until all the animals became like the antelope, with long wiry legs to run fast with, and a keen sense of smell to warn them that danger was near. The

lions and tigers would do the choosing, just as men do with tame pigeons—except that men keep those they fancy and eat the rest, while the lions and tigers eat those they fancy and have to leave the rest!

ANTELOPES IN KHAKI.

Speed and scent are not, however, the only things that might change a mixed herd of deer-like animals into antelopes.

Why do our soldiers wear khaki instead of the fine scarlet coats that they used to wear? They do so because they want to hide themselves from the enemy while they are advancing towards him. A clever marksman can hit a soldier at a distance of more than a mile—if *he can see him*. If the soldier wears a red coat, he can be seen very easily, because the bright red colour “shows up” against the dull colours of the soil. But if the soldier wears a khaki uniform, he does not “show up” at all.

Why are our battleships painted grey? It is a dull, dirty grey, not nearly so pretty as the white turrets and the yellow funnels of the warships I used to admire so much when I was a boy. This is done to hide the battleships, so that the enemy's ships will not make a target of them.

I remember being on a steamer one day about a mile or two off the south coast of England. Looking towards the shore, I saw, after a while, something that looked like the blurred shadow of a ship. I looked again, and said to myself: “No, it is not a

ship; it is only my fancy." Later on we came nearer to the shore, and I noticed that the shadow was moving. By-and-by I saw that it *was* a ship, grey from the top of the masts to the edge of the water. If this warship had been painted in the old way, I would have seen it at once.

It will be easy for you to understand what this kind of "safety-colouring" means to an animal. Let us get back to our mixed herd, and suppose that they show different colours—some white, some black, and some khaki like the soldiers. When the lions and tigers came prowling around, they would be able to spot a white or black animal at once, and it would be the first to be chased. The khaki ones would be like the Prince in the fairy stories, who wears an "invisible cap" as he walks among ogres and witches. In time the lions and tigers would hunt down and kill all the white and black animals, leaving the khaki ones.

That is how it comes about that most antelopes have yellow-brown hides. Their hides hide them! The herd of mixed colours is changed into a herd of khaki-coloured antelopes.

"UNITED WE STAND, DIVIDED WE FALL."

I would like to speak of one other thing that helps a herd to fight its enemies. I will take a herd of wild horses this time, because horses give the best example of what I mean.

An animal like the tiger is not afraid to attack

one horse. It sneaks up near the herd, and waits until it finds a straggler by itself; then it springs on it. If the herd were to take fright and scatter in all directions when the tiger came near, that would suit the tiger almost as well, since he could tackle one of the runaways at a time. The baby horses would fare the worst, because they are weaker and not able to run so fast. With a lot of tigers hunting a herd where the older horses bolted and left their young to look after themselves, the herd would get smaller and smaller until, perhaps, there were none left at all.

Now see what would happen if some of the horses were so brave, and so fond of their young, that they were ready to stand and defend them, even at the risk of their own lives. Plenty of timid animals get very bold when their babies are attacked. Even a hen will fly at a dog or a cat that dares to come near her chickens.

These extra-brave horses are likely to be extra-wise as well, and able to understand that if they keep together they can defend themselves and their young much better. What really happens when a herd of horses is attacked is that the mares and foals are bunched together, and the big strong stallions form a ring round them. When a tiger draws near he finds plenty of teeth and hoofs waiting for him. Let him spring at one horse, and in a moment some other horse gives him a tremendous bite or kick hard enough to break his bones.

So the horses prove the truth of the motto,

"United we stand, divided we fall." They are like a group of small boys who protect themselves against a big bully by keeping shoulder to shoulder.

Horses which had not learned to keep together and defend their young would be killed off. Horses which had learned to *combine* and were ready to die for their young would live and prosper. So the animals we call horses would change from a mixed lot of timid and bold, loving and selfish animals, into animals which were all bold and self-sacrificing.

I could give you lots of other examples of how Nature chooses one special shape or colour or kind of animal, and in so doing *changes* the original style of animal into a new breed. Men do little more than imitate Nature when they produce a Pouter from a rock pigeon. Nature has its own ways of picking and choosing—that is all the difference. And Nature's ways of picking and choosing are called "natural selection," to keep them distinct from man's way, which is called "artificial selection."

ANIMAL FAMILIES.

When you look at a picture-book of animals, or when you go to the Zoo, I am sure you must notice the likeness between animals we call by different names. For example, the tiger, the leopard, the jaguar, the pole-cat, and the wild-cat: they are all like cousins of each other and of the cats that sleep all day on our hearth-rugs.

Watch the tiger or the leopard washing his face, and you will say, "How like a cat!" Watch the baby tigers or the baby leopards playing, and you will say, "How like a kitten!" All of them, too, have the same stealthy soft tread, the same kind of teeth, the same kind of whiskers, and so on.

Then, again, look at all the different kinds of animals we call "monkeys"—the little marmosets, the brown monkeys that the Italian organ-grinders bring round with them, the orang-outang, the gorilla, and the chimpanzee. There also you have a family likeness—and sometimes a likeness to the human family as well! Sometimes you see men that look very like monkeys; and often people say, when they are watching monkeys, "How human they look!"

As for birds, there are hundreds of different kinds that are far more like each other than the Pouter is like the Fan-tail, or the Carrier, or the Jacobin, or any other of the breeds of pigeons. The thrush, the blackbird, the nightingale, the chiff-chaff, the sparrow, the starling, the finches—a whole crowd of them!—the lark, the robin: all these clearly belong to the one family. Indeed, it takes a man years and years of careful study before he is able to tell all the members of the bird family from each other.

And when you know that the Pouter, the Fan-tail, the Jacobin, and the other pigeons all come from the wild rock pigeon, it is not difficult to agree that all the wild birds have come from some great-great-grandfather bird.

So, also, you will agree that all the members of the cat family came from some great-great-grandfather cat. And all the monkeys from some great-great-grandfather monkey.

This explains how it is that the men who study animals (*Zoologists* we call them) are able to divide animals up into great families or tribes. They can do it with swimming fishes, shell-fish, snails, insects, snakes, and every kind of animal. And in each of these families the different members were produced by "natural selection."

"CIRCUMSTANCES ALTER CASES."

Perhaps you are a little puzzled about how "natural selection" can produce many different animals from the one animal. You understand how "artificial selection" can produce different breeds, because men choose different things, like stand-up tails, or big chests, or strong flight, in the case of pigeons. And you understand how Nature can change an animal in one way, as in the case of the antelope. But how can Nature select in different ways?

A favourite line in my school copy-book used to be "Circumstances alter cases." This means, in the case of animals, that when their surroundings differ the animals are likely to differ.

Nature provides all sorts of surroundings. At the North Pole there is perpetual ice. At the Equator there is perpetual heat. Life in a valley

is different from life in the mountains. Rivers, deserts, swamps, and plains make their own kind of world.

When you think it over, you will see that different surroundings mean different kinds of animals. The camel, living in the desert where there is little water, must be able to go for many days without drinking. The white bear, living in the ice-world, must have a thick fur and plenty of fat to keep him warm.

Imagine a family of animals growing so big that some of them wander away to find new homes, like people emigrating to America. They wander to a place where the climate or the food is different from what it is in the place they came from. Those who find the climate too hot or too cold, or who are not able to eat the new food, will die. Nature will kill off those that do not suit themselves to the new life, and it will choose the ones that suit themselves best.

In this way Nature will produce animals different from those which stayed at home. "Circumstances" will alter "cases."

If the animals wander north, south, east, and west from their first home, those that wander north will change in a certain way, those that wander south will change in another way, the east-going ones in still another way, and the west-going ones in yet another way. The animals that Adam named in the Garden of Eden would have changed very much in all sorts of ways if they had scattered over

the face of the earth. After a while Adam would find it as hard to recognize them as to believe that the Negro, the Chinaman, the Esquimo, the Indian, and all the other strange men of the world were his own children.

HOW PLANTS FIGHT FOR THEIR LIVES.

After this long story I hope you will be ready to agree with me that each of the great families of animals had the same greatest grandfather. And it will be easy for you to agree that the story can be told of plants as well as of animals.

Just as men by "artificial selection" produce new kinds of roses, sweet peas, tulips, and other garden flowers, so Nature by "natural selection" produces different kinds of wild plants and trees. Plants have to fight for their lives just as the animals have to do. They fight for room to push their roots into the soil and their branches into the sunshine; they fight against animals that want to eat them, against insects that burrow into their trunks, and against "blights" of all sorts.

Why are there so many buttercups in our fields? Because the buttercup has a sour taste, and the cattle will not eat it. If the buttercups were not sour, the cows would gobble every one of them up, and so prevent the flowers making seeds out of which new buttercup plants would grow. Then the buttercups would die out.

That is one of the ways that plants fight for their

lives. They cannot run away or hide themselves, so they have to try other ways. A sour taste is one way. Thorns are another. The cattle on a heath never touch the blackberry or gorse bushes, because of the prickles with which they are armed.

The blackberry, you see, is very like the hedgehog, who wears a coat of sharp bristles to defend himself against the enemies who would gobble him up if they could. And in finding different ways of



The "Dandelion Parachute," which floats away when you play "what's o'clock" with a dandelion head. The little blob at the lower end is the seed.

guarding themselves in different countries plants will change in different ways.

I am not forgetting that plants cannot wander about as animals do. They live and die in the spot where they grow—unless a man comes along and digs them up and transplants them. But the seeds

of a plant can travel long distances. When you play "what's-o'clock" with a dandelion head, each of the little fluffy things you blow off is a dandelion seed, hung from a kind of parachute. On a windy day these tiny parachutes are carried for miles, and they may drop upon ground which is quite different from the ground on which the daddy-dandelion grew.

Again, the mud sticking to the hoofs of a stag or the feet of a bird may contain seeds. So the animal carries the seeds with him on his travels, perhaps to drop them many miles away from their home. Seeds, again, are washed into rivers and carried out to sea, where the currents bear them to other shores. The Gulf Stream, you will remember, sweeps from the Gulf of Mexico right across the Atlantic to the shores of Europe.

These are some of the ways that plants "travel." And when plants travel they change just as animals change. "Circumstances alter cases" with plants as well as animals.

Now we can give some sort of answer to the question, "Where did the plants and animals come from?" They came from other once-upon-a-time plants and animals which were the ancestors of the great families of plants and animals. And they came by the road we call "natural selection."

WHERE DID THE ANCESTORS COME FROM?

Would you be quite content if I ended this chapter here? I wonder! Four-year-old Gerald

would certainly not be content. He would be sure to say to me: "But where did the ancestors come from?"

To answer this question right away you must take a great big jump. Plants and animals are grouped, as you know, into several great big families of plants and of animals. What if all the plants and all the animals belonged to the same families?

I can almost hear you say: "Oh, nonsense! Fancy asking us to believe that a plant like the potato belongs to the same family as the pine-tree, and that the worm is a cousin of the rhinoceros!"

Well, why not? You will answer, I suppose, "Because they are so different. Far more different from each other than a tiger is from a cat, or an apple tree from a pear tree. They are so different that they cannot be related to each other."

Here a Scotch proverb will help us out of the difficulty. It says that "Mony sma's mak' a mickle." This means that many little things make a big one, or that many little differences together make a big difference.

Think of a hundred animals, each the son of the one before it, and each son differing a little from its father. The hundredth son will be ever so much more different than the second son from the first father. A hundred "little differences" will have made a big difference. And if there were a thousand animals, the last would differ ever so much more again from the first. And if there were a million

animals, the difference between the first and the last would be simply tremendous.

THE ACORN, THE MUSTARD SEED, AND THE EGG.

There is another way I can help you to see that Nature can manage big differences as well as little.



The Oak and the Acorn. The acorn is the seed of the oak, and out of that tiny little seed grows the huge tree from which the "wooden walls of Old England," like Nelson's famous ship *Victory*, used to be built.

Let us pretend that you had never seen an oak tree in your life, and that you know nothing at all

about oak trees. I give you an acorn—the little thing that looks like an imitation of your father's pipe. Then I show you an oak tree, with its great thick trunk and its high spreading branches; and I tell you that the oak tree grew out of an acorn. Would you not say, "Oh, nonsense! Fancy asking me to believe that a huge tree grew out of a tiny little thing like an acorn!"

Yet you know that if you plant the acorn it will send a root into the ground, and force a shoot into the air, and that the root and the shoot will grow bigger year by year until the acorn becomes an oak sapling. After more years the sapling becomes a tree; and after still more years the tree grows big enough for its trunk and branches to be cut down for timber.

You will remember, too, the grain of mustard seed that is mentioned in the Bible (Matthew xiii, 31). This tiny seed grows into a tree in whose branches the bird lodge. Again, think of the young barnacle and the old.

These things show that, as far as plants go, Nature can manage a tremendous difference if it is given time to do it. The same is true in the case of animals.

Let us pretend, again, that you had never seen a hen or a hen's egg. If I showed you an egg—that simple thing of shell and white and yolk—and then showed you a hen, would you not marvel that a great big cackling thing with wings and claws and feathers could grow out of so plain a thing as an egg? Yet you know that if the egg is kept warm

for a few weeks the white and the yolk will change into a fluffy little chicken that will peck its way out of the shell and appear in the world with its wings and claws and beak all complete.

Is there any more difference between a potato and a pine tree than between an acorn and an oak tree? Is there any more difference between a worm and a rhinoceros than there is between an egg and a hen?

There is not. And since you know that the oak tree came from the acorn, you see that it is not impossible for a pine tree and the potato to have come from the same plant. Again, since the hen came from the egg, it is not impossible for the worm and the rhinoceros to have come from the same animal.

Nature, in a word, is able to make such wonderful changes in plants and animals that all animals may belong to one family, and all plants to one family, in spite of their differences. In other words, all animals come from the one greatest-grandfather animal, and all plants from the greatest-grandfather plant.

It will be easier for you to understand this if you remember that Nature has had plenty of time to bring about all these tremendous changes in her families of animals and plants. What I have been telling you about "natural selection" has to do with fossil animals and plants, just the same as with the animals and plants of to-day. The animals and plants we know are the children of those we see in

the Fossil Books of Stone. The pages of these books tell us the steps by which Nature changed the first animals and plants into those still living. They show us the Family Tree of living things. And if we know how long ago it is since these Stone Books were made, we know how long Nature has had to build up the Family Tree.

WHEN FOSSILS WERE ALIVE.

I would like you to guess how long it is since the first fossils were alive. People used to believe that the world was only 6,000 years old. But you will remember that one of Charles Darwin's sons says that it was about 500 *million* years ago that the earth gave birth to the moon. Some millions of years must have passed, after that wonderful event, before the earth became cool enough for anything to live on it; but even if we gave away 400 million years for the cooling, we would still have 100 million years left!

That is a good long time, is it not? It is so long that no one can get a clear notion of it into his head. Even to think of a million years makes one dizzy. And the men who have studied the Stone Books have put the age of the first fossil pictures at over thirty million years. This is, of course, only a kind of clever guess; but we are quite sure that the earliest rocks with fossils are many millions of years old.

Nature, then, has had millions and millions of years

to build up her Family Tree. During this long, long time, too, the face of the earth has changed again and again. The rising and falling of the land, which I told you about in the last chapter, kept altering the "circumstances" in which the plants and animals lived; and, as the circumstances altered, the plants and animals must have altered. All these changes hustled things along, as it were. It was just as if Nature was extra busy in her workshop during the "once upon a time" when fossils were alive.

CAN A PLANT BE AN ANIMAL?

Before I end this chapter I am going to give you one more marvel to swallow. It is not a bigger marvel than the growth of an oak tree from an acorn; but it will seem more wonderful because it is strange.

What is the difference between a plant and an animal? You may think this is a very easy question to answer. You may tell me that a plant grows in the ground, and that an animal is able to move about. But some plants live in the water, and some animals—like the "coral"—do not move about at all. It is really a most difficult thing to tell the exact difference. Plenty of old men with grey beards and bald heads have been very puzzled over it. After they have found out just how plants live, and just how animals live, they come upon little creatures that seem to live partly as plants and

partly as animals! These little creatures were called "plant-animals," because they behaved like both plants and animals.

Again, there are some living things, so tiny that they can be seen only through a very strong magnifying-glass, that seem to be neither plants nor animals. They are just little blobs of jelly-like stuff that is alive.

Now, if it is so difficult to tell the difference between plants and animals, if some creatures look like both plants and animals, and if others are neither plants nor animals, is it not possible that both plants and animals came from the same kind of living thing? This means that both plants and animals belong to the same family. In other words, all living things belong to one great family, and have all come from one greatest-grandfather.

In the next chapter I will tell you a little about what this greatest-grandfather was like, and about the steps by which the first of living things changed into different kinds of animals.

IN SHORT.

Animals have "family trees" and "family likenesses," just like human beings.

All men and women belong to one large family.

Animals, like pigeons or dogs, and plants, like roses or sweet peas, belong to one family.

Different kinds of tame animals, like pigeons

or dogs, come from the one kind of pigeon or dog, because men choose special kinds to breed from.

This kind of choosing is called "artificial selection."

Different kinds of wild animals come from the same greatest-grandfather, because Nature chooses those which suit different climates and other circumstances.

Nature's way of choosing different breeds is called "natural selection."

The same thing is true of plants as well as of animals.

All the animals in the world belong to one great family.

All the plants in the world belong to one great family.

The family history of plants and animals covers millions and millions of years.

Both plants and animals have come from the one kind of living thing.

What was the greatest-grandfather of creation like?

CHAPTER V •

WHO WAS THE FIRST MAN?

WHO was the first man?

This may seem a strange question to ask at the beginning of this chapter, which is supposed to tell you about the greatest-grandfather of creation. Man, you know, does not appear until the very last pages of the Stone Books. He is the greatest-*grandson* of creation; and what you want to learn about is the greatest-grandfather!

Now I can remind you of another proverb: "The longest way round is the shortest way home."

Perhaps the proverb is not always true, but it is often true. If you have ever tried a "short-cut" across fields that you do not know very well, very likely you lost your way, and so found out that the long way round by the high road would have been the shortest way to the place you wanted to reach.

At any rate, I am going to take you the longest way round in this chapter. Instead of trying to go straight to the first living thing, I am going to begin at the First Man, who is at the end of the Family Tree of life.

Who was the first man?

One of the answers to this question is given in the Bible. The first chapter of Genesis tells us that

“God created man in his own image, in the image of God created he him; male and female created he them.”

The second chapter of Genesis tells the story in a different way. It says that “The Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul.” Later on, in the same chapter, we are told how woman was made: “The Lord God caused a deep sleep to fall upon Adam, and he slept; and he took one of his ribs, and closed up the flesh instead thereof; and the rib, which the Lord God had taken from man, made he a woman, and brought her unto the man.”

This is a very, very old answer to the question, “Who was the first man?” And it is much the same answer as is given by savages who had never read the Bible. Nearly every savage race has its legends (or fauciful stories) about the First Man.

The Maoris of New Zealand say that their god Tiki took some red clay, mixed it with his own blood, shaped it like a human being, and then gave it breath. In Tahiti, one of the South Sea Islands, the natives said that the Creator made man out of red earth, and one day caused him to fall asleep. While the man slept, the Creator took one of the man's bones and made a woman out of it.

These heathen stories are very like the Bible story. But other tribes of savages believe quite different stories, some of which are really funny.

In Mota, one of the Banks Islands, the people

relate a legend that Qat, a great hero, made men out of clay taken from a marshy riverside. At the same time he made pigs just like men! His brothers grumbled at him for doing this, so he knocked down the pigs on all fours, and left the men to walk upright.

This is quaint enough, but not so quaint as the story told by some of the wild men of Borneo. They say that in the beginning two great birds tried to make man. First of all they made trees, but could not manage to make men out of trees. Then they tried to make men out of rocks, but all they managed was to make statues. Lastly, they took some earth, mixed it with water, and shaped a man who lived.

The Kirmis, a native tribe of South-east India, also give a very strange answer to the question, "Who was the First Man?" They say that God set to work to make man after he had made the world and the trees and the creeping things. He made a clay man and a clay woman; but at night, when God was asleep, a big snake came and ate the clay figures. After this had happened two or three times, God got up very early one morning, and made a dog out of clay. Then he made another clay man and woman, and set the dog to watch over them. The next night, when the snake came as usual to eat the man and woman up, the dog barked and frightened it away.

Some of the native blacks of Australia used to tell how Pund-jeel, the Creator, made the first two

men of clay. First of all, he cut three sheets of bark with his knife. Then he took a big lump of clay, spread it out on the bark, and made a clay man. Then he made another man, and he was so pleased with his work that he danced round the figures. Next he took some stringy bark from a tree, made hair out of it, and stuck it on the heads of the clay men. Again he was so pleased that he danced round them. To make the clay men live, he lay down on them and breathed very hard into their mouths and noses. When they began to stir he danced round them a third time, and made them get up and speak.

MEN AND OTHER ANIMALS.

All these stories read just like children's fairy tales; but then, you know, savages are very like children in many ways. And when you remember that they knew nothing about the Stone Books, or about "artificial selection," or about "natural selection," you will agree that they made some pretty good guesses.

I think the natives of Mota were quite clever with their story of the men and the pigs. They saw that men had a kind of family likeness to pigs. Both pigs and men had two eyes, one nose, one mouth, and four limbs. Perhaps the natives were cannibals as well as eaters of pork, and so would find out that men's bones and muscles were much on the same lines as those of a pig, while both the

pig and the man had two lungs, one heart, one stomach, and other parts of the body just like each other.

It was quite natural for these natives to think that things which were so much alike as pigs and men had been made in the same way at the same time.

There is another heathen legend which shows that even savages saw the family likeness between men and animals.

In the Pelew Islands the natives have a legend that the first men were made out of clay mixed with the blood of various animals. So the first men and their children came to be like the animals whose blood had been mixed with the clay. This was how the Pelew Islanders explained why some people were "fierce as a lion," "gentle as a lamb," or "sly as a fox." These people had come from great-grandfathers who had some of the blood of the lion or the lamb or the fox in their bodies.

In other ways the savages show that they believe the animals to be their relations. Natives of Samoa—the island where Robert Louis Stevenson spent the last years of his life—say that they have come from a shark. Stevenson wrote a poem around this legend. Perhaps the Samoans thought that because they were such fine swimmers and fierce fighters they must have descended from a shark.

Other tribes say that they have descended from animals, and they use the name of an animal as a kind of sacred token. Some of their notions are so

queer that they set one laughing ; but you and I know that savages who believe that they and the animals belong to one great family are nearer the truth than people who say that men and animals are quite, *quite* different from each other.

THE FAMILY TREE OF MAN.

Legends, you see, tell us all sorts of stories about the first man. To find out the truth for ourselves we shall have to climb the Family Tree of Man right to the very top.

The first part of the climb is by way of the history books, which tell us about the men and women who lived hundreds of years ago. But after we have climbed back two or three thousand years we find hardly anything to make a history book out of. People did not know how to write in those days ; and one can only guess what sort of folk they were by the ruins of their monuments and cities. And if we climb another few hundred years back the history books have nothing at all to tell us.

Here we seem to get lost. There are no more branches for us to climb ! But although we have got past the oldest ruin, or the oldest writing on stone tablets, we have not really lost all traces of our ancestors. History books may fail us, but what about the Stone Books ? Have they anything to tell us about the men who lived "once upon a time" ?

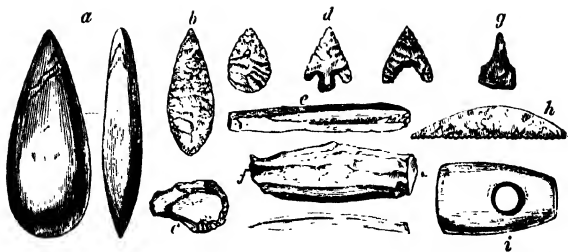
In the very last pages of the Stone Books we do

—as I hinted before—find some signs of men and women. Buried in the clay at the edge of rivers, or in the soil that covers the floors of caves, we find human bones. These bones tell us a good deal about the men who lived in these caves or on the banks of these rivers. But they do not tell us so much as the odds and ends in the way of tools and weapons that men left behind them.

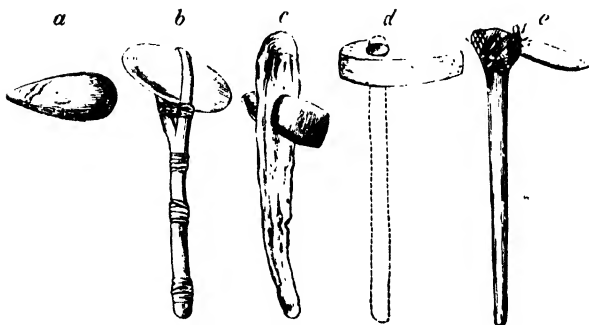
The oldest of these odds and ends were made of flint. Flint is a very curious thing. It is a very hard stone found in lumps inside chalk, and when it is broken it splinters into long thin pieces with very sharp edges. If you have ever cycled near the South Downs, you will know how sharp a piece of flint can be. The roads over the South Downs are (or used to be) dressed with flints taken from the chalk of which the Downs themselves are made. When the flints get crushed by the wheels of wagons they break into sharp-edged pieces, which are very bad for bicycle tyres. One day I found a little sharp piece of flint, just like a nail, right through my bicycle tyre.

OUR SAVAGE ANCESTORS.

Now, a savage who had no pocket-knife, who did not know how to make iron or bronze or any other hard metal, would find a piece of flint very handy as a knife or a chopper. He could use it in fighting his enemies, in killing game, in cutting it up. He could use it to trim a piece of wood for a bow or for



Weapons and tools made by our great-grandfathers of the Stone Age. These are a little better made than the rough flints shown on page 105. (a) is a stone hatchet. (b) a spear-head of flint. (c) a scraper. (d) three flint arrow-heads. (e) knives made out of flakes of flint. (f) the core left after the flakes are taken off. (g) flint awl. (h) flint saw. (i) stone hammer head.

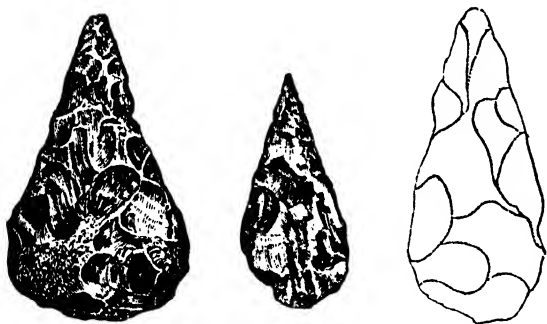


This picture shows how like the weapons of our great-grand-fathers of the Stone Age are to the weapons of savages living to-day. (a) is a polished stone hammer of the Stone Age, found in England; (b) is a pebble, ground to an edge and mounted on a twig, from Brazil; (c) is a sharp stone mounted on a wooden club; (d) a stone axe bored to take a handle; and (e) is a stone axe from the South Sea Islands.

To face p. 105.

the handle of an axe. He could also use it to tip his arrows.

And we do find, among the very first signs of men in the world, flint tools and weapons near the surface of the ground. These flints have hardly changed since the day when men shaped them—and thought themselves very clever! You can see lots of them in museums, along with the still more ancient fossils of animals that swarmed over the world before man came into it.



Some of the weapons made by our savage great-grandfathers of the Stone Age. They are pieces of flint chipped into the shape of picks or hatchets.

I would like you to go and see a collection of ancient stone weapons if there is one in the town where you live. When you look at them carefully, you will see that there are two kinds—one rough and the other smooth. The rough tools and arrowheads have been made just by chipping flint. The smooth ones have been made first by shaping a hard stone and then by rubbing it smooth.

What does this difference mean? It means that men first learned to chip flints, and then learned how to make stone more useful by rubbing and polishing it. From other signs we know that a long time passed before men learned how to do the rubbing and polishing. Men learned very slowly in those times. The better weapons were made by men who lived in times not quite so far away as the days when flints were first chipped.

In some museums you will find, alongside these old, old weapons, stone axes and knives taken a little while ago from savage tribes. The axes and knives are just like the old polished stones. We know how the savage tribes live and what sort of people they are; and the likeness between their weapons and those made by the men of long ago tells us something about how these men lived and what sort of people *they* were. They, too, were savages.

After our savage ancestors had learned to make stone weapons, they made another great advance. They learned to make metals. The first metal they learned to make was copper; the second was bronze, which is a mixture of copper and tin. So they passed from what is called the Stone Age to the Age of Bronze.

I would like to tell you a lot more about how our savage ancestors slowly learned one thing after another—how they managed to make boats out of tree-trunks; how they built huts to shelter them; and how they made cups and plates out of clay, and how they first clothed themselves. But it is too

long a story to tell here, and I think I have told you enough to let you see that our savage grandpapas were like boys at school. They were always improving, always learning something new. The wide world was their school; and their punishment, if they did not learn their lessons well, was to die of hunger, or to be killed by some wild beast or by another man who could make a sharper axe or a better bow-and-arrow. So Nature "chose" the cleverest and most active men by killing off the stupid and lazy ones. It was a hard school, but it made men "get on."

"LIVING LIKE ANIMALS."

If we could get a glimpse of the world when the Stone Age was just beginning, we would see men living like the most ignorant savages. Perhaps I would be nearer the truth if I said "living like animals." We call savages "brutes," because in many of their habits they are not much better than animals. Our grandfathers before the Stone Age were lower than the lowest savages we know to-day.

This, in a way, is an answer to the question, "Who was the First Man?" He was a creature little better than the animal, and a good deal worse than the savage.

Perhaps you will feel that I am not speaking very nicely of our greatest-grandfather. Perhaps you are a little bit annoyed to think that you are the greatest-grandson of such a savage. But you will

feel better about it when you remember that *he* lived many hundred thousand years back, and we have "risen in the world" a lot since that long, long ago.

THE FIRST MAN'S GRANDFATHERS.

Where did the First Man come from?

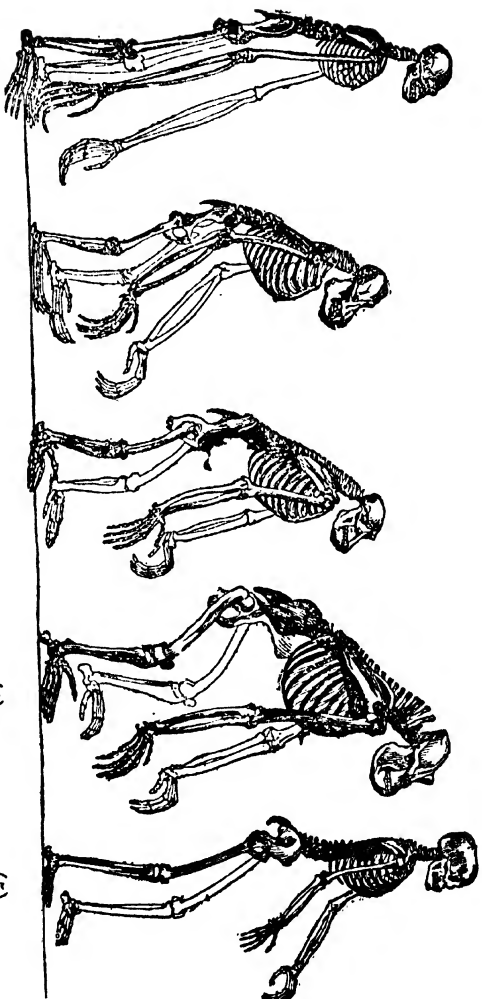
This question will remind you of the question, "Where did the plants and animals come from?" And if plants and animals came from other plants and animals, did the "First Man" come from other men?

This sounds absurd, because the First Man must have been the First Man! Of course he must! Then where, you may ask in wonder, did he come from?

The answer to this question lies in the Stone Books. Among the latest pages we find not only flints made by men, but the bones of men who lived before the days when men learned to make flints.

When I say "the bones of men," I mean the bones of creatures who were more like men than anything else. They were not quite men. They were like men in the making.

Now, take a good long look at the five skeletons I show you on the next page. They make a queer procession, do they not? They are like a file of recruits, some of whom have not learned to keep their heads up as they march. The first one and the last one march best, and they are a little more



Skeletons of a man and some of his forty-second cousins. (1) Is a gibbon; (2) is an orang; (3) is a chimpanzee; (4) is a gorilla; and (5) is man himself.

handsome than the others, not only because they walk straight, but because they have nicer-looking heads and limbs. Numbers two, three, and four in the file have ugly big jaws. Number one's jaw is not quite so bad, but it is not quite so good as number five's jaw. Besides, number one has great big arms, reaching almost to the ground.

You will be able to see other differences if you look for them; but, in the face of all the differences, these five animals are not at all unlike each other. There is a kind of family likeness among them. They are all built on the same plan, with the same number and kind of bones in the arms, hands, legs, and feet, with hip-bones, and backbone, and ribs, and skull, and jaws.

Supposing your teacher were to hang a big picture of number five on the blackboard and tell the class to draw it, I expect many of the drawings that your schoolfellows would make would be just as like number one, two, or three, or four, as like number five. They would not be able to draw number five so exactly that you could tell at once that it was not one of the others in the procession.

What does this mean? Surely it means that all these animals—the gibbon, the orang, the chimpanzee, the gorilla, and man himself—belong to the same family. I do not mean that men came from the gorilla or the gibbon or the orang or the chimpanzee, but that all five came from the same great-grandfather. You can see for yourself that they are not so different from each other as the various breeds



This is a young orang-outang photographed in his sleep. He looks just like a little old man having a snooze.

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of pigeons are different from each other. And if all the pigeons came from the rock pigeon, it is not difficult to believe that all the apes and man himself came from the same ancestor.

Years ago, before people had found out how



This is "Sally," the Chimpanzee, who was one of the sights of the Zoo in London. She is seen eating her porridge "just like a human being." The Chimpanzee is one of our forty-second cousins.

wonderfully animals *could* change, everybody would have laughed at the idea of men and apes having come from the same great-grandfather. "What nonsense!" they would have said; "fancy expecting us to believe that we are forty-second cousins to

these hairy ugly monkeys!" All the same, there are some men who are hairy, and plenty of men who are ugly—"just like monkeys"! And there are some savages that are more like animals than they are like English people. They go about naked; they live in holes in the ground or in huts that are not so neatly made as a bird's nest; and they are not much more clever than a well-trained sheep-dog.

Some apes, you know, can be tamed to behave in many ways like a human being. One chimpanzee learned to wash his hands and face, dress himself, sit up at table, tuck a table-napkin under his chin, use a knife and fork, drink from a cup, wipe his mouth with the table-napkin when dinner was finished, fill a pipe, light it, and smoke it. Other animals, like dogs, bears, elephants, and sea-lions, can be trained to do clever tricks, but they never manage to do them in a human kind of way, as an ape can. When an ape, dressed up in ordinary clothes, sits down to dinner, he gives you a queer feeling that he is human—with a difference.

THE DIFFERENCE BETWEEN MEN AND APES.

What, then, is the difference between an ape and a man? I do not mean the difference in the colour of his skin, or his hairiness, or the shape of his thumb, or any other thing that does not amount to very much. I mean the *real* difference.

Let us have another look at our five skeletons. The gibbon, you will remember, is most like the

man. One difference you will see at once is that the gibbon's arms are longer than the man's arms. But the length of an arm does not make any difference in the way people behave. There are some men with arms that reach almost to their knees, but their long arms do not make them behave like



Some Gorillas at play—just like a lot of little boys. The Gorillas also belong to our forty-second cousins.

gibbons! When you look closely at number one and number five you will notice that number one has a smaller and flatter head than number five. The gibbon's skull seems about half the size of the man's skull. That is to say, the gibbon's brain,

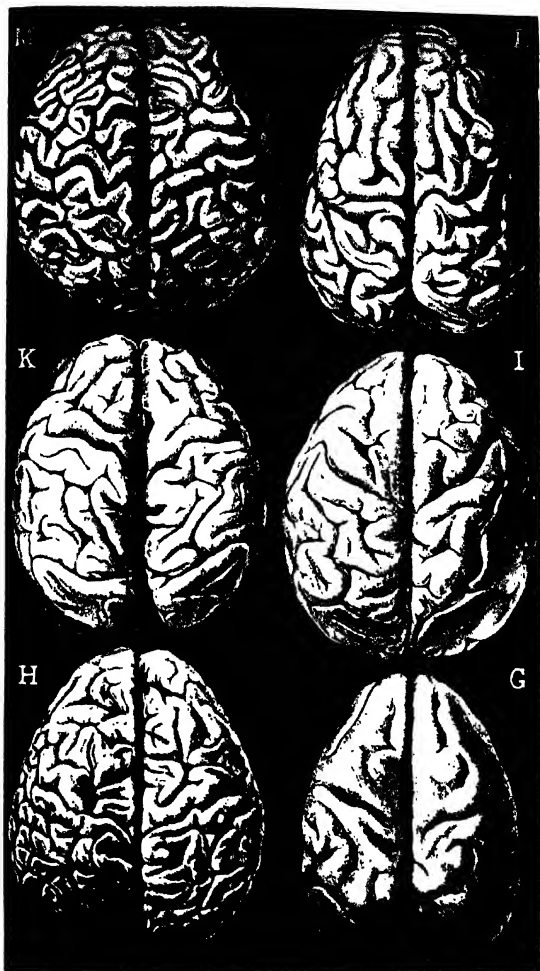
which is inside his skull, must be smaller than the man's brain. This is the real difference.

You know what your teacher means when he tells you that you are not using your brains. The brain is the machine inside your head that learns and thinks. It is your brain that learns the multiplication table, guides your pen when you write, tells you how to move your knife when you are making a boat, guides your foot when you are going to kick a ball, makes you understand how a steam engine works, and why you have to poke the fire to make it burn brightly.

People with good brains are able to learn quickly, to find out things that other people are too slow in seeing, to invent machines, to write good books, to compose music, to lead armies in battle, to govern countries, to command ships, to discover cures for diseases, and do all sorts of wonderful things.

Cleverness is worth far more in the world than strength. An elephant can squash a man by sitting on him, or kill him by picking him up in his trunk and dashing him to the ground. But men, because they have a better brain, are able to train elephants to be their servants—pulling wagons and lifting timber. Men are called the "lords of creation" because they have the best brains.

A few pages back I told you that men in the Stone Age were very much like the savages we know to-day. Now, if you put the brain of an Englishman alongside the brain of a wild man from Borneo, you will find that the Englishman's brain is much



Some milestones on the Better Brain Road which led from Apes to Men. G is the brain of a gibbon, H of a chimpanzee, I of an orang-outang, K of a gorilla, L of an Australian savage, and M of civilized Man. You will see that M is bigger and more "curly" than any of the others. It is the best brain.

To face p. 114.

bigger and better made than the Borneo man's brain. In just the same way, an Englishman's brain is bigger and better than the brains of our great-grandfathers who lived in the Stone Age.

And if we go still further back into "once upon a time," we come to creatures with brains still smaller than those of the men of the Stone Age. Indeed, the brains get so small that they are more like those of an ape than like those of a Stone Age savage. The men who lived in those days were "ape-men." They were almost first cousins to the gibbon!

OUR APE-MAN GRANDFATHER.

So the answer to the question, "Where did the First Man come from?" is that "He came from an ape-man"! And he came by the "Better Brain Road." Just as in the Stone Age Nature "chose" the cleverest men and killed off the stupid ones, so in the earlier age of ape-man Nature favoured the clever ape-men, and helped them to "get on" in the world. Men came from "ape-men" by "natural selection."

ARE YOU ANGRY?

By this time, I expect, you are quite ready to follow the ape-man family further back until we come to the animals that were the grandfathers of both the apes and the men. But before we go any further down the Ladder of Time, I would like to

say something about the people who get angry when they are told that men came from animals like apes.

"I didn't have a monkey for a grandpapa," they say. And they are so fierce about it that they refuse to look at the Stone Books to find out the truth. They are like the priest who refused to look through Galileo's telescope in case he should see something that would make him change his mind!

The old idea, which you will find in the Bible and other Sacred Books, is that the First Man was a kind of angel. He became a man because he did something wrong, and so "fell" from the level of an angel to that of a man. The people of long ago had never looked into the Stone Books. They had never seen the flint arrow-heads made by their ancestors in the Stone Age. They had never seen the fossil skulls of the "missing links" between the apes and men.

Neither, I may add, had they ever seen the angel from which man was supposed to have fallen!

We know that man did not fall, but that he has been climbing and climbing and climbing for thousands and thousands of years. An angel may be a very wonderful thing, but is it more wonderful than an ape-man that began about a million years ago to grow more and more like a man until he became a real man, still growing cleverer and better until he became like us?

When we think of that long journey from the ape-man to great men like Charles Darwin, it seems



A Gorilla Family Party. These distant relations of ours have quite a human look about them.

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silly to be annoyed because we cannot believe any more that the First Man was a kind of angel. To be worse than the First Man is no great credit to anybody, is it? • But to be an improvement on the First Man is something to be proud about.

After all, why should we be ashamed to have animals for our forty-second cousins? People are not ashamed to love their dogs and horses, and to admire them for their faithfulness and devotion. Some people, indeed, love their dogs and horses more than they love their own cousins. When a dog has been your trusted friend for years, you do not despise him because he is "just an animal." When he dies, you mourn for him as if he were a human being. And you know quite well that many a dog is so loyal, so affectionate, so well-behaved, so ready to give his life for his master, that some men and women are not worthy to be compared with him.

In any case, men are just what they are, whether they have fallen from angels or climbed up from the animal. It does not make us any better than we really are to say that the First Man was an angel or something quite different from any animal. It does not make us any worse than we really are to know that our great-grandfather of a million years ago was an ape-man. I think indeed, that we ought to be proud of ourselves for having managed to climb so far, even if it did take us a million years to do it!

A REMINDER ABOUT THE FIRST MAN.

To find out where the First Man came from will help us on the way to finding out about the great-grandfather of creation.

Savages have many legends about the First Man.

The Stone Books tell us that the First Men were like savages, with flint weapons.

These first men "lived like animals."

In many ways men are like the apes.

The Stone Books give us pictures of creatures that were half-way between apes and men.

Ape-men became men by getting slowly cleverer and better through thousands and thousands of years.

CHAPTER VI

WHO WAS THE GREATEST GRAND-FATHER OF CREATION ?

THE Chinese make some wonderful things out of ivory. One of these wonderful things is a box with a smaller box inside it; and inside *that* box is another smaller one; and inside that other box is still another smaller. And so it goes on—box inside box until you come to the tiniest piece of ivory right in the middle.

The chapters of this book are just like that wonderful ivory box. Each question has another question inside it. As soon as I give an answer to one question, that answer pops up like a mark of interrogation, and asks a question on its own account.

I have told you something about the First Man, and where he came from. The First Man was a savage who came from an ape-man, who came from an ape, who lived many hundreds of thousands of years ago. Now, then, where did the ape come from ?

Perhaps you could almost guess the answer to this question without looking at the Stone Books to give you a hint. For you see that the man was an improvement on the ape-man, and that the ape-man

was an improvement on the fossil ape. During these years the animals were climbing a ladder up to the level of human beings. They were "getting on" or "going ahead" slowly but surely. They were "evolving," as the wise men say. "Evolving" means "coming out of," as a chicken comes out of an egg, or as man comes from the ape-man.

THE APE'S GRANDFATHER.

So you may guess that the ape came from an animal that was not quite so clever, or so strong, as the ape. We have to look in the Stone Books for some animals which were older than the apes and yet like apes. The name given to these animals is *Lemur*. Ever so many different kinds of lemur are alive to-day, just as there are ever so many kinds of ape still in the world. But the lemurs of the Fossil Books are different from their great-grandchildren lemurs of to-day. And the fossil lemurs, in turn, had grandfathers who were the ancestors of all these lemurs, and also of the fossil apes, who were the ancestors of man.

Lemurs are funny little animals, some of them like monkeys and others more like cats. The word lemur means "ghost," and the name was given to them because they come out only at night, and they move about without making the least noise. But if they are ghosts, they must be the ghosts of the great-grandfathers of the apes, the monkeys, the ape-men, and men themselves!

THE LEMUR'S RELATIONS.

When we open the lemur-box to find out about the lemur's relations, we come upon a most wonderful group of animals. If you did not already know



This is the Gentle Lemur, one of a family closely related to the Apes. The great-grandfather of the Lemurs was the great-grandfather of the Apes as well.

how one kind of animal can change into several different-looking kinds, you would hardly believe what I am now going to tell you. The grandfathers of the lemurs had a most higgledy-piggledy family—just as higgledy-piggledy as the “Happy Families” you sometimes see in cages—with cats, crows, parrots, cocks, hedgehogs, and other creatures living together. There were not only lemurs in the family, but several other kinds of animal.

Among the near relations of the lemur were animals that are called Insectivores. I am sorry that I cannot give you a shorter name, but I can give you an easier one. “Insectivore” means “insect-eater.” And there is no need to tell you what insect-eater means. The name is given to this group of animals because it is a handy way of telling us how they all lived.

Insect-eaters are living to-day as moles, hedgehogs, and shrew-mice. These animals do not seem to have changed very much from the insect-eaters of the Stone Books. The fossil insect-eaters, however, were the great-grandfathers or the great-grand-uncles of five different families.

The first family is made up of tigers, cats, lions, dogs, wolves, foxes, and similar animals. They are all flesh-eaters.

The second family includes horses, cows, antelopes, elephants, giraffes, and other animals with hoofs. Here the animals took to munching grass and leaves. They were what we call “vegetarians.”

The third family lives underground—rabbits,

mice, and other burrowing animals. They made holes in the ground to hide from their enemies.

The fourth family lives in the air. On a still night you can see the flying creatures who come from the same ancestors as the fossil insect-eaters. They are bats.

The fifth family lives in trees. They became lemurs and apes, who became ape-men, who became men.

When you climb a tree, and enjoy the fun of it, remember that your relations of a million years ago used to spend most of their time running up and down trees and swinging on the branches.

Although I have told you about these five families in a few lines, a long, long time passed before their fossil ancestors changed in these five different ways. You can guess, from what I told you before, how they came to change. If some of them wandered away to a place where there was none of their usual food, they would have to find other food or die. Those who managed to live by eating other animals grew into beasts of prey, with sharp teeth, strong muscles, and a keen scent.

Others who took to nibbling grass and herbs grew into peaceful animals with flat-topped teeth, which help them to chew leaves. Some of these peaceful souls found safety by living in herds, as the wild horses do.

Others hide from their enemies by making their homes underground, as the rabbits do.

Here, as everywhere, "circumstances alter cases."

The animals that took to catching flies in the air would grow like birds, while those which hid themselves in trees would be "chosen" for their cleverness in hanging on to branches, and in swinging from tree to tree—like monkeys. These changes went on very, very slowly—so slowly that if you had been alive at the time you would never have noticed any difference, even if you had lived a hundred years. If you had been Methuselah, who lived nine hundred and sixty-nine years, you might have seen a little difference.



The Duck-mole, which has a body like a mole and a bill like a duck. As it feeds its babies in the mammal way, and yet lays eggs like a reptile, it is a link between the reptile family and the mammals.

With all the animals I have told you about in this chapter, the baby animals are born from the mother, just as puppies are born from the mother-dog. And all the mothers feed their young as the mother-dog feeds her puppies, or as the cow feeds her calves. That is to say, the babies suck milk from their mothers until they are old enough to eat the same food as the mothers eat.

When you grow up and learn more about animals,

you will find out that the way young animals are born, and the way they are fed, are very important things. They tell us which big family the animals belong to. All the animals that feed their babies with mother's milk are called *Mammals*.

Now, when we look around the animal world for the simplest kind of mammal, we come upon a queer beast called the duck-mole. It is called a duck-mole because it has a body like a mole and a bill like a duck. It looks like a freak animal. But the queerest thing about it is that, while the mother feeds her young as the mammals do, the young are not born as the puppies and calves are born. The duck-mole *lays eggs*.

I seem to hear you say: "Well, what if the duck-mole does lay eggs? Is there anything wonderful in that?"

THE FOSSIL REPTILES.

The wonderful thing is that the only other beasts which do lay eggs are the birds and the reptiles—the animals that fly and the animals that crawl. Inside the duck-mole box we find the reptile box, which means that the duck-mole really came from a reptile. So you see that the reptile grew into an animal like the duck-mole, and little by little into other kinds of mammal I have told you about. Among them was the ape, which grew into an ape-man, which grew into a man. There is a chain that leads from man right back to the reptile!

That is enough to make you sit up and rub your eyes, is it not? But perhaps you are not so very much surprised, because you have learned how wonderfully animals change when they have millions of years to do the changing. Nature can work marvels, if you give her time enough.

I do not mean to say, of course, that man came



An ancient Reptile, called the Pariasaurus. This picture has been drawn from the hints that the fossil bones of this ugly old animal give us.

from a snake. That is not true, any more than it is true that man came from a monkey. But the Fossil Books do tell us that men and the snakes, lizards, and other reptiles we know to-day, all came from some ancient animal that belonged to an early reptile family.

THE REPTILE'S GRANDFATHER.

This is not the first time I have spoken about reptiles. In an earlier chapter I told you something about flying reptiles. And when you remember that both birds and reptiles lay eggs, you will be ready to see that birds and reptiles may be closely related to each other.

When we look in the Fossil Books for the first birds, we find them half-bird and half-reptile. The scales of the true reptile are beginning to grow into feathers by becoming longer and getting fluffy at the edges. Later on the bird-reptiles slowly lose their reptile appearance, and become more like birds.

I would like to tell you more about how reptiles grew into birds; but as the birds have a branch of the Tree of Life to themselves, and did not grow into anything else but birds, I must get back to the grandfathers, and the grand-uncles, of men!

WHAT DID THE REPTILES COME FROM?

Scotch people are said to answer a question by asking another question. So the Scotch answer to this question would be: "Have you ever heard of the Royal Marines?"

The Royal Marines are "soldiers and sailors too." They are trained to fight either on land or on sea. For this reason they are called "amphibian," after the animals which can live either on the land or in the water.

The reptiles came from "amphibians." The Stone Books at one part are full of amphibians and reptiles, most of them very ugly creatures. Compared with many of them, the frog is a very handsome fellow. And if you want to know how an amphibian lives, you can find out from the frog. The frog lays eggs, which grow into tadpoles—

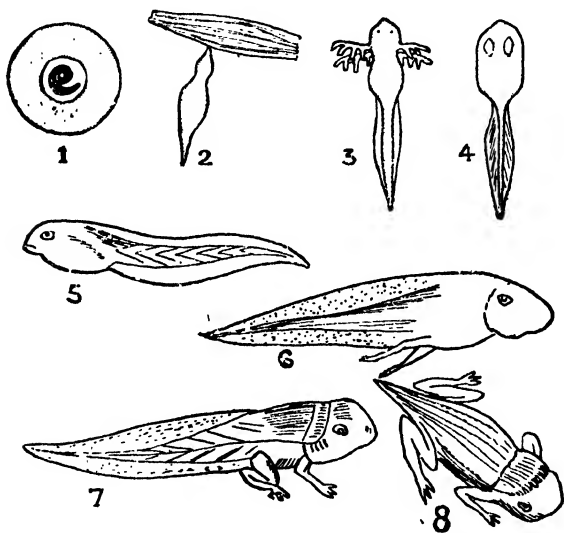


Some of the ancient animals that lived both in and out of water, and were thus called "Amphibians." They lived at the time of the forests that are now seams of coal a long way underground. Amphibians are a link between the Fish and the Reptile.

those funny little all-head-and-tail "fishes" you can see in streamlets. The tadpoles themselves grow in a peculiar way. First the hind-legs appear; next the fore-legs come; and then the tail slowly disappears, because the growing tadpole actually feeds

on it! When he has eaten up his tail he becomes a frog, and is able to live on land.

So you see that a "fish out of water" is not such an out-of-the-way thing after all.



Chapters in the Life of a Frog :—(1) A Frog's egg, with a little tadpole curled up inside it. (2) The tadpole just hatched out of the egg and holding on to a blade of grass by its sucker. (3) The tadpole in the fish-like stage, with gills at its neck for breathing in water like a fish. (4) and (5) The tadpole grows bigger. (6) The first sign of the hind legs of the frog. (7) The first sign of the front legs. (8) The frog nearly complete. It will be complete when its tail has all disappeared. The frog is an amphibian because he lives both in water and on land.

I do not think you will find it hard to believe that an animal which lived part of its life in the water and part on land came in time to live only on the

land. That is an easy step up. And if the land rose well above the sea, the amphibians on it would be forced to make the best of living on land.



The "Goggle-Eyed" fish out of water. This picture shows this curious fish climbing a tree. Other fishes are able to breathe in air as well as in water.

But suppose I asked you to believe that the amphibians came from animals that once lived all their lives in water?

THE AMPHIBIANS' GRANDFATHER.

This is not quite so easy to understand. Yet there are, to this day, fish that are able to live out of water. The "climbing perch" uses his spiked fins to pull himself up the trunk of trees, and he has got so used to climbing that he would die if you kept him always under water. Again, on the coasts of the Indian and Pacific oceans there lives a goggle-eyed fish with a name almost as long as himself. This fish is also able to climb the trunks of trees.

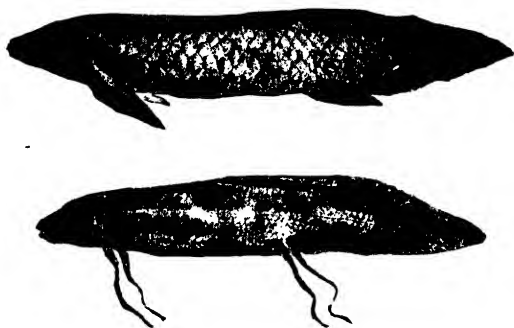
Most fishes, however, die when they are taken out of the water. Why is this? It is because they have no lungs for breathing air. You and I live by taking air into our lungs, and using the oxygen in the air to purify our blood. If we do not get air to breathe, we are suffocated and die. Fishes, instead of having lungs, which use up the oxygen in the air, have gills for using up the oxygen of air which is mixed with the water. Their "works" keep them alive in water. Our "works" keep us alive on land—or, at least, out of the water.

"DOUBLE-BREATHING" FISHES.

· This looks like a difference which even Nature, with its wonderful cleverness in changing one kind of animal into another, could not get over. From the water-animal, with its gills, to the land-animal, with its lungs, seems so big a jump. But if we look

at the Fossil Books again, we shall find something that will help us.

Among the fossil fishes that lived in the days before amphibians and reptiles appeared, there were some peculiar animals called "double-breathing" fishes. They had gills for breathing in water, and lungs for breathing in air. They were able to make the best of both worlds. So long as they got food they would be able to go on living on the surface of the sea or under water.



Two kinds of fish that are able to live out of water. The upper one is the Australian "mud-fish." They are like the "double-breathing" fish we find in the Fossil Books.

In Australia, Africa, and South America there are fishes which are double-breathers. The Australian "mud-fish," as it is called, lives in rivers which dry up so much in summer that nothing but stagnant pools are left. Every now and again the fish in these pools come up to breathe the air. These queer

fish help us to understand the double-breathing fish we find in the Fossil Books.

The double-breathing fish, you see, has to make only one step up to find himself an amphibian, able to live either on land or in the sea. He is the "missing link" between the true fish and the amphibian. Inside the amphibian box you find the double-breathing fish box; and inside the double-breathing fish box you find the ordinary fish box.

FROM THE FISH TO THE "BOUBLE-BREATHING" FISH.

I have told you about many strange things in this chapter; but I would not be surprised if you found this the strangest of them all. Fancy a fish with gills growing a lung which would help it to live out of water! How could that have come about?

It will help you to understand this if I tell you something about a submarine. A submarine is a ship which can be closed up tight, so that no water can get into it even if it is right under the sea. It is a fish-ship. It is divided up into sections, some of which can be filled with water or with air. When the submarine "dives," these sections are filled with water, which makes the submarine so heavy that it sinks. When the submarine rises, the water is pumped out and air is pumped into the sections in place of the water. So the submarine gets lighter, and rises to the surface.

Every fish has inside it a "floating-bladder," with

air inside it. The fish can make this bladder bigger or smaller. As it gets bigger, the fish gets lighter and rises. As it gets smaller, the fish sinks. That is how the fish is able to swim at the level that just suits it when it is searching for food or swimming away from its enemies.

There are many reasons for thinking that it is this floating-bladder that became the lung of the double-breathing fishes. It does not take much change to make a floating bladder into a lung. Only one simple step up was needed to change an ordinary fish into a double-breathing fish.

So we can go up the ladder, rung by rung, from the fish to the double-breathing fish, the amphibian, the reptile, the mammal, the ape, the ape-man, and, finally, up to man. (*See Frontispiece.*)

Next time you have a bathe and revel in the delight of swimming and diving, you will not wonder why you find it so jolly to take off your clothes and play at being a fish. Millions and millions of years ago you *were* a fish. The love of the water is "in your blood."

THE GRANDFATHER OF THE FISH.

You may think that, after opening one animal box after another and getting to the fish box, we have gone far enough. "Man's greatest grandfather lived in the sea." It takes such a long time to get used to such a queer idea that perhaps you do not want to peep inside the fish box and see what the fish came from.

If that is how you feel, you can skip the rest of this chapter. All the same, we have not yet answered the question, "Who was the greatest grandfather of' creation?" We have only got to one of the greater grandfathers.

The fish was not the first animal to have his picture made in the Stone Books. There were many humbler animals before him.

Before I go on to tell you about these humbler animals, I would like you to remember that the fish himself is a humble sort of animal. A fish can see, and he can also hear. Every fisherman, sitting patiently with his rod and line by the riverside, knows that noises will frighten the fishes away. But the fish is not nearly so clever an animal as a dog. He has no "feelings" like a dog. All he does is to swim after the things he wants to eat, and to swim away from the bigger fish that want to eat him. We are not even sure that fish feel pain, even though they wriggle so much when they are hooked.

When the fish becomes an amphibian, the amphibian a reptile, and the reptile a mammal, he rises in the world, just as the ape-man rose when he became a man. We talk about the "lower animals" and the "higher animals," meaning that the higher animals are more clever than the lower animals. Their "works"—and most of all the brain and nerves—have improved.

Man is the highest of all animals, because he has the most wonderful brain. His brain helps him to speak, to write, to make tools, and to do ever so

many things that even the ape-man could not do. "Onward and upward" is the motto of the Stone Books. While lots of animals, like the huge reptiles I have told you about, died out altogether, and while special families, like the ants and bees and birds, seem to have stopped improving, we can trace a golden thread of improvement through the Stone Books from the fish up to men. It is like a road through a forest with many by-paths leading from it. The road winds, and shows faintly here and there, but it is never broken and never lost.

ABOUT BACKBONES.

Now we can come back to our fossil fish, and ask where it came from. We would expect it to come from some still humbler animal—some lower kind of fish.

When you have a herring for breakfast, you soon find out that the fish is not a very simple kind of animal. It seems full of bones, and you have to separate it very carefully to get the fish away from the bones. The biggest bone of all runs from the head to the tail; and if you are very careful with your knife and fork, you will find that all the little bones which give you so much trouble sprout from this long bone. It is called the backbone.

Every one of the animals I have told you about in this chapter, from fish to man, has a backbone. It is like the keel of a ship, to which all the ribs of the ship are fastened. But a backbone is more than

just a keel or main support. Down the inside of the backbone runs a kind of tube of nerves, connected with the brain at the front or top of the backbone. This tube is called the "spinal chord," and the nerves in it control the movement of the legs and tail and other parts of the body. Nerves are like telegraph wires, along which the brain sends messages to the muscles.

In the Stone Books the first animals with backbones are the fishes. The fossils that belong to older rocks are of animals with no backbone. They seem to be as different from a fish as an oyster is from a cat.

Here, then, is another puzzle for us. If the fish came from a simpler animal, it must have come from an animal with no backbone. So we have to explain what looks like a jump from "no backbone" to "backbone."

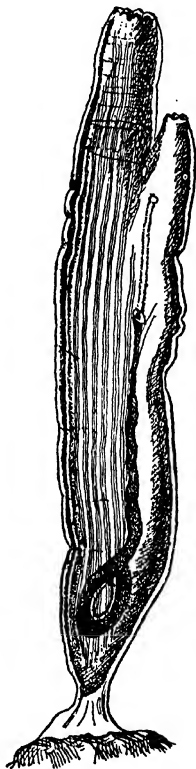
THE WONDERFUL LANCELET.

For a long time no one could tackle this jump. No one knew anything between the no-backbone and the backbone. But by and by a link was found.

In the sand of shallow seas there lives a little animal called the "lancelet." It is between one and two inches long, and looks like a torpedo or a transparent worm. It does not have a backbone. Indeed, it has no bones at all. But it has a cord of gristle running from one end to the other, like the lead up the middle of a pencil.



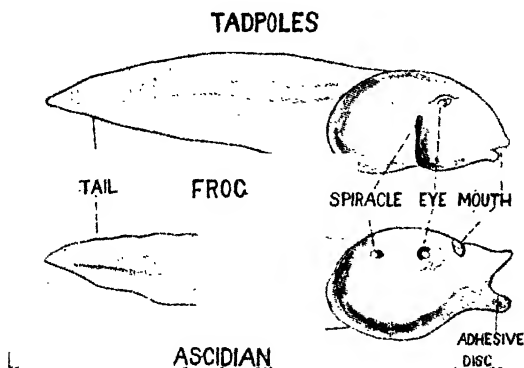
The Lancelet, a little torpedo-shaped animal that makes a link between the animals with no backbone and the animals with a backbone. This picture is a sketch of his "insides." The dark line right down the middle is the beginning of a backbone.



This is the Sea-Squirt, an animal with no backbone. All the same, it gives birth to tadpoles, which have the beginning of a backbone, just like the Tadpoles of the Frog. See the next picture.

This cord is a kind of first attempt at a backbone. You will find it easier to understand why it is looked upon as "a backbone in the making" if I tell you about the sea-squirt.

The sea-squirt is a little animal that fixes itself to rocks by a kind of stalk. It has no backbone, but it gives birth to little tadpole-like babies which



The Tadpole of the Frog and of the Sea-Squirt (here labelled Ascidian). They are just like each other, but, while the Tadpole of the Sea-Squirt grows into an animal with no backbone, the Tadpole of the Frog grows into an animal with a backbone. This shows that animals without a backbone are not so very different, after all, from animals with a backbone.

have a cord just like that of the lancelet. Later on, when the tadpoles grow, they fix themselves to a rock and lose their cord. But while they are tadpoles they are almost exactly like the tadpole of the frog. When you see their pictures side by side—the tadpole of the frog and the tadpole of the sea-

squirt—you can hardly tell one from another. Both have a big head and a long thin tail. *And both have a cord of gristle along the back.* In the frog-tadpole, however, the cord grows into the backbone of the frog. It is the beginning of a backbone.

So you see it is not very difficult to build a bridge between the animals with a backbone and animals with no backbone. The lancelet and the sea-squirt tell us what the bridge may have been like. I do not mean that the fishes all came from the lancelet and the sea-squirt. All I mean is, that the lancelet and the sea-squirt are a kind of half-way house, showing the way that a backbone-less animal might easily have grown into a fish.

A HINT FROM THE SHELL-FISH.

Let us turn again to the Stone Books, and look at the animals in the ages before the fish came along. Nearly all these animals were shell-fish. A shell-fish is an animal that wears its bones on the outside. It is quite soft itself, and, instead of "cutting teeth" like a baby, it grows a hard shell to protect itself against the crabs and fish that want to gobble it up.

When we take a shell-fish out of its shell, cut it up, and look at it under a magnifying glass, we find that it is a very much simpler thing than a fish. It is not much more than a mouth to catch food, a stomach to digest it, and a passage to throw out the waste part of the food.

The shell-fish in the Stone Books are very much like those we find to-day among the rocks on the sea-shore. But when you hunt for shell-fish on the sea-shore you come upon lots of little animals that do not have their pictures in the Stone Books. At low tide on a sandy beach men go out with a spade and bucket, not to build sand-castles, but to dig for worms. They use these worms as bait for catching fish.

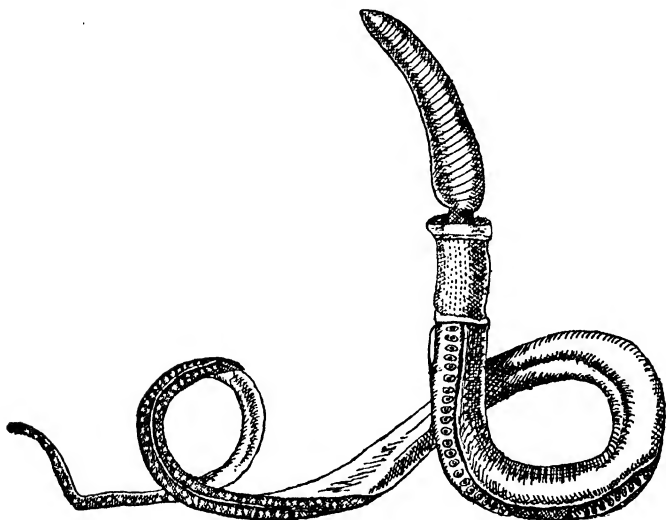
WORMS AND WORM-FISH.

Now, why is it that we do not find any pictures of worms in the Fossil Books? If you have ever put a worm on a hook, you will not puzzle long over this question. A worm has no bones, no shell. There is nothing hard about it; and when it dies it just rots away, and leaves nothing to tell anybody that it ever lived. Millions of worms might have crawled through the mud and sand millions of years ago, and the rocks made out of that mud and sand would show no trace of them. *They* left no "foot-prints on the sands of time."

So it comes about that the Stone Books do not help us in finding out what these worms were like. All the same, we are pretty sure that the fish came from a worm-like animal, and not from the shell-fish that have left their mark in the Stone Books. It would take me too long to tell you just why we are so sure of this, but I can give you at least one hint. In the mud of the sea lives a worm called the acorn-headed worm, because of the acorn-like shape

of its head. This worm has got slits for breathing, and it has a cord along part of its back. It is, as you see, a kind of worm-fish, a half-way house between the worm and the fish.

With the help of the acorn-headed worm and other worms we can guess how the worm grew into



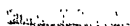
The Acorn-Headed Worm, which has gill-slits like a fish. It is a kind of half-way house between the Worms and the Fishes.

a fish. And when we want to find out where the worm came from, we have to guess again from living animals. The Stone Books do not give us any help, since the animals that lived before the worms were

certain to be soft and boneless, like the worms themselves. So they left no fossil pictures of themselves.

Charles Darwin wrote a big book about worms. He spent five years in writing this book. It was all about the earthworms that the blackbirds are so fond of eating. When you are older you will be able to read this book and learn how wonderful a thing is the common worm.

All the same, you are not too young to learn a little for yourself about how the earthworm lives. Take a good look at the grass some day after a night of rain. You will find every here and there a little



The ordinary worm that the blackbirds are so fond of. It is just a long pipe.

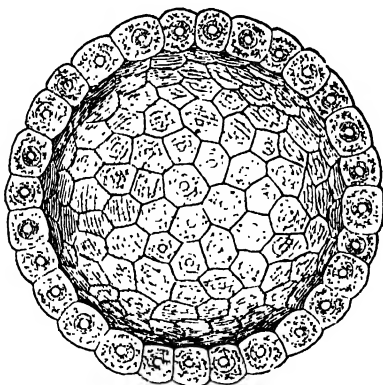
pile of things that look like little worms. They are made of earth. On the sea-shore, after the tide has gone out, you will see little piles of the same kind, made of sand. How did these piles come there?

You can make a very good imitation of these worm-like piles if you squeeze a tube of paint. An artist, when he squeezes his paints on his palette, makes worm-like piles of paint. Now, the worm is just like a long tube or pipe. He swallows the earth at one end, and he feeds on the food that the earth

contains. He has no use for the sand and clay, so he squeezes it out of the tail-end of the pipe, and thus makes the worm-like thing we call a "worm-cast," because it is cast by the worm. And the worms that live on the sea-shore do just the same thing with the sand.

FROM PIPE-ANIMALS TO BALL-ANIMALS.

Now let us suppose that we stop up both ends of the pipe. This makes the worm like a simpler



A Ball-like Animal. This animal is just a ball of "cells." It has been cut in two to show how it is made up of cells or "compartments."

kind of animal that we find living in the sea. It is just a tiny living bag or ball. It does not even pretend to have a stomach. Each part of it takes

in food and throws the waste part out again. It eats and drinks with its skin !

These ball-like animals are so tiny that we have to study them under a strong magnifying glass. "Under the microscope" is the correct phrase. And when we magnify them we find that they are built up of compartments. Imagine a railway train bent round in a circle until the front of the engine is right against the back of the guard's van. Each carriage has its compartments, so that the train, bent round, makes a ring of compartments. When we speak of living things, we call these compartments "cells," so that we talk about a ball-like animal being a round bundle of "cells."

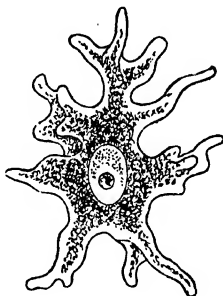
The most curious thing about these bundles of "cells" is that each little cell is able to live by itself. It takes in its own food, and throws away its own waste stuff. It is, by itself, a living thing ; and the ball-like animal is just a bundle of living things.

FROM A BALL OF CELLS BACK TO ONE CELL.

Now, if I ask you what is simpler than a bundle of living things, you will be able to answer right away, "One living thing." One cell is simpler than a ball of cells. And with the help of a microscope and a jar of pond-water, it is not difficult to find a cell living quite separate from other cells. I give you on the next page a picture of this wonderful little animal, which is called the *Amœba*. The picture is many times the size of the real animal.

ONE OF THE SIMPLEST ANIMALS.

I expect, when you look at this picture, that you will say that the amoeba is "all legs." But these "legs" are just parts of the cell that the animal pushes out when it wants to move in the water or to catch food. They are legs and arms and stomach and everything else in one, because the amoeba can

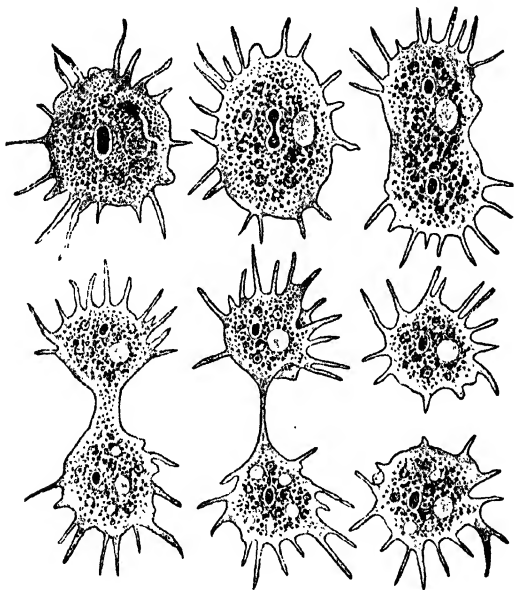


One of the simplest animals in the world—the Amoeba. It is just a single cell—legs and arms and stomach all in one.

take food in at any place, and it can thrust out any part of itself if it wants to wriggle along.

Although it can take all sorts of shapes, and has—as you see in the picture—an egg-shaped thing in the centre, with a little circle inside the egg, it is nothing more than *one simple cell*. The ball-like animals are bundles of cells like the amoeba stuck together. And the amoeba is one of the simplest of living things.

It is not a very big jump from a single cell to a bundle of cells, and when we know more about the amoeba we can tell how the jump may have been made.



How the Amœba "multiplies" itself. It grows bigger and bigger and then gets a narrower waist that finally breaks. Each half is a complete Amœba, and goes on living by itself.

The amoeba does not grow seed like a plant, nor does it lay eggs like a hen. You might look for years through the microscope without finding a

single baby amœba. But you would not look long before you discover how a new amœba comes into the world. After an amœba grows big, it splits into two. A narrow part like an isthmus appears right down the middle of the amœba, and then one half separates from the other. Each half is a new amœba; it is a complete cell, and it sails away by itself, catching food and growing until it, in turn, splits into two.

That is how the amœba multiplies itself. Two times one are two; two times two are four; two times four are eight; and so on. This goes on so quickly that a single amœba can produce a big family in a very short time. And if you suppose that the halves stick together instead of separating, you can see that one amœba might become a bundle of amœbæ. That is to say, a one-cell animal might become a ball-like animal with many cells.

WE ARE A BUNDLE OF CELLS.

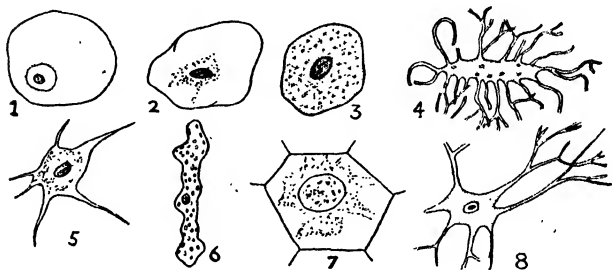
Now that you have got to know what a cell is like, I can tell you one of the most wonderful things about ourselves. If you were to take any part of the human body—the skin, the flesh, the bone, the nail, the hair, or the brain—and look at it under a microscope, you would find that it is made up of tiny cells—hundreds and hundreds of cells packed together. All these cells are not exactly alike. The cells of the brain are different from the cells of bone, or flesh, or hair, or any other part. But they are all

cells. Men and women and boys and girls are just bundles of cells!

With every animal it is just the same. Every animal is a bundle of cells.

With every plant it is just the same. Every plant is a bundle of cells.

All living things, you see, are bundles of cells.



"All living things are bundles of cells." Here are some different kinds of cells. (1) is the egg-cell of a chicken; it grows step by step until it becomes a chicken. (2) is a cell from the human tongue. (3) is a cell from the human liver. (4) is a bone-cell, with twisted arms that grip the arms of cells next to it, and so make tough bone. (5) is a cell from the outside of a tooth. (6) is the cell of a plant: the tiny spots on it are green, and give the plant its green colour. (7) is a cell from a brain of a reptile. (8) is the cell of a nerve, with many "telegraph wire" nerves sprouting from it. All these cells are very much bigger in the picture than they are really. The picture shows them as they are seen through a microscope.

If you were sitting before me in a class at school, I would stop here and ask you if you could answer the question, "What was the greatest grandfather of creation like?" For I have almost told you already.

All living things are bundles of cells.

The single cell is one of the simplest of living things.

The single cell grew into an animal with many cells, the animal with many cells grew little by little into a fish, the fish into an amphibian, the amphibian into a reptile, the reptile into a mammal, the mammal grew into an ape, the ape grew into an ape-man, and the ape-man into a man !

THE SIMPLEST LIVING THING.

I have squeezed the whole of this chapter into three sentences. And they will lead you straight to the right answer: "The greatest grandfather of creation was formed by a single cell."

How the first living things came into the world we do not know. Some wise men of science say that they "just grewed," like Topsy in the story. Others say that they must have been created, just as the Bible tells us that God created Adam. When you are older you will be able to puzzle over the question for yourself. And perhaps by that time we shall have learned more than we know now about the beginnings of life. But already, as you see, we know quite a lot about the simplest living things; and we know how they grew and changed until they brought all the different animals into the world.

A WORD ABOUT PLANTS.

I could tell you, in much the same way, about

how all the different families of plants came into the world. But it is a long and tangled story, and you would not understand it very well until you had learned a good deal about the way plants live.

All I need say here is that plants grow out of other kinds of plants, just as animals grow out of other kinds of animals. And if we go back from the higher plants to the lower plants, we find them getting simpler and simpler until they are nothing but strings of cells floating in water.

Beyond these strings of cells we come upon the single cell, so simple that we can hardly say whether it is a plant or an animal. It is just a tiny blob of living matter, which may change into either an animal or a plant.

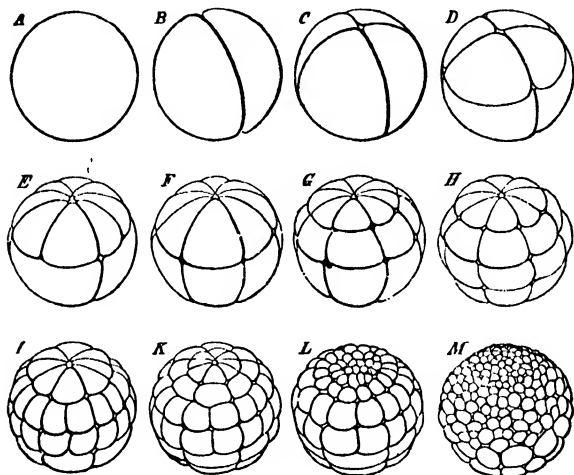
HINTS FROM THE ACORN AND THE EGG.

I have tried to make the story of the animal and plant Family Trees as clear as I could, but perhaps I have not managed to make you feel quite sure that the animals and plants we know could have grown from anything so small and simple as a single cell. If this seems too wonderful to be true, remember the acorn and the oak; remember the egg and the hen.

The acorn has inside it a tiny seed-cell. The rest of it is stuff on which the seed feeds when it begins to grow. Put an acorn on the top of a small tube of glass, filled with water, and after some days the acorn will push a root into the water, and a tiny

twig with leaves into the air. It begins to grow into a tree. And the root and the twig feed on the nutty part of the acorn.

As for the egg, it helps us even more than the acorn does. The yolk of an egg is a *single cell*, filled with



Showing how one cell becomes many cells. The picture is of a frog's egg, which begins as one cell marked A. First it divides into two cells, marked B. Then into four cells, marked C. Then into eight, marked D, and so on it goes dividing and dividing until we get to M, which is a bundle of cells. Later on this bundle of cells becomes a tadpole. A hen's egg starts in the same way as one cell, and goes on dividing until it becomes a chicken.

yellow food stuff. The white of an egg is also food-stuff, and the shell is just a covering to keep this single cell with its food together. After the egg is laid and kept warm by the hen sitting on it, the single cell in the yolk begins to divide into two as

the amoeba does, and it goes on dividing and feeding on the food-stuff around it until it grows into a chicken. When the chicken is full-grown it pecks its way out of the shell, and then begins its life in the farmyard.

There is no doubt that a hen grows from a single cell. We can follow the change day by day from the single cell to the complete hen. If only we could take snap-shots of what goes on inside an egg, we could show the whole thing growing from the single cell to the chicken, and so on to the hen, in a kind of cinematograph picture.

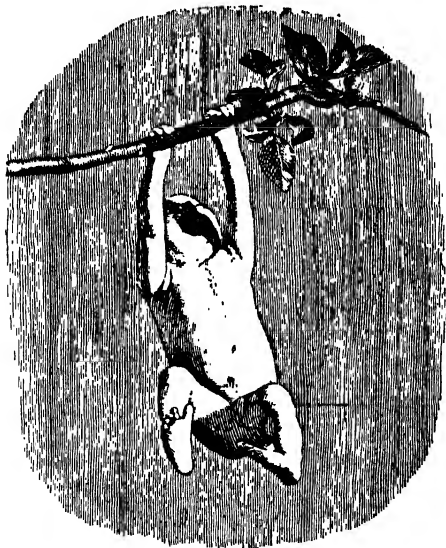
Why, then, should we think it so strange that a bird like a hen should have come from a single cell that lived millions of years ago?

Again, an animal like a monkey begins life as a single cell inside its mother. This single cell divides and grows, and becomes a baby monkey. And the most curious thing is that this baby, while it is growing up in its mother's womb, takes shapes that remind us of the fish, the amphibian, and the reptile. It is just as if the coming baby monkey climbed up the tree of life that monkeys, as a family, had slowly climbed as they grew out of other animals. These reminders of the fish, the amphibian, and the reptile tell us something about what the great grandfathers of the monkey really were.

You will learn another curious thing if you slip your finger into the hand of your little baby brother. You will find that he grips it hard—far harder than you would think a tiny baby could grip it. A baby

two weeks old has so strong a grip that he can hang by his hands on a bar. And as he hangs he looks just like a little monkey swinging on the branch of a tree!

This is another reminder that the apes and ourselves are cousins!



This child was only three weeks old, and was able to hold himself up for more than two minutes. He looks just like a little ape. This picture reminds us that we are related to the Apes.

I have told you a great deal in this chapter—more, perhaps, than you can “take in” at once. But really I have told you only a tiny little bit of all that has been found out about the Tree of Life. I hope that what I have told you will make you want to know more.

CHAPTER VII

WHERE DID ALL THE RELIGIONS COME FROM ?

WHEN Dick Whittington sat down to rest on Highgate Hill, the bells of Bow Church rang out a message for him :—

Turn again, Dick Whittington,
Thrice Lord Mayor of London.

London has grown a lot since the days of Dick Whittington ; and if you were to sit on Highgate Hill on a Sunday morning, and hear all the church bells ringing for service, you would not be able to spell out a message so easily from the muddle of chimes. Of course you could not hear *all* the bells of London churches, because most of them are miles and miles away from Highgate Hill. But if a fairy gave you magic ears, so that you could listen to all the church bells in London, the booming and clanging and ding-donging on a Sunday morning would deafen you.

THE MESSAGE OF THE CHURCH BELLS.

All the same, these church bells have a message for you. They tell you that there are ever so many religions in London. When people put on their

best clothes on Sunday morning, some go to a Roman Catholic Church, some to the Church of England, some to the Wesleyan Church, some to the Baptist Church, some to the Congregational Church, some to the Unitarian Church, or the Christian Science Church, or the Presbyterian Church. Then there are meetings of the Quakers, the Plymouth Brethren, the Sandemanians, and other special religious "sects" or groups. In Bayswater you will find a Greek Church, where there is a gallery from which you can watch and listen to most curious ceremonies. (In Russia the Greek Church is the chief Church.) Dotted all over London are synagogues where the Jews worship. Down in the East End, near the Docks, you will find a Chinese colony, which has its own temples and rites. Among the people in London are Mohammedans, who take off their shoes when they enter their temples; Hindoos, who think it a sin to eat certain kinds of food; Buddhists, whose religion is older than Christianity. And in the British Museum you will find statues of ancient Greek gods, idols worshipped as gods by savage tribes, and many relics of ancient Egyptian, Babylonian, and other religions.

I have told you the names of only some of the world's religions. There are so many of them that you could spend the whole of a long life learning about them, and not get near the end of all there is to be known about them.

Where did all these religions come from?

Perhaps you are not very curious to find out the answer to this question. If I talk about Buddhism, or Hinduism, or Christianity, it makes you feel that this is going to be a very dry chapter. Religions do not seem to be so interesting as plants, animals, or people. Religions don't seem to belong to the wonders of the world.

STRANGE THINGS ABOUT RELIGIONS.

All the same, I can promise you that the story of religions is as good as a book of adventure. It is full of all sorts of queer, quaint things. Parts of it are amusing—like the account given of the New Zealand native priests, who call the attention of their gods by jerking a string tied round the neck of images. Parts of it are terrible—like the human sacrifices at religious festivals, the torturing and killing of “heretics” by the Spanish Inquisition, and the dreadful wars that were fought between people who believed in different religions. Other parts of it are very puzzling, even to grown-up people; but I am not going to worry you about those parts. I am just going to tell you a little about how religions are born, how they grow, and how they die.

It may seem strange to talk about religions *growing*. When I was a boy I used to think of a religion as something fixed and settled for ever. But, at the same time, I used to think that the different kinds of plants and animals had been fixed

and settled for ever—at least, since they had been created and put in the Garden of Eden. You and I have seen, in the last few chapters, that plants and animals are slowly changing, and that all of them have grown from the simplest forms of living things. Now I am going to show you that religions have also changed, and that all of them have grown from the simplest forms of religion.

HOW THE FIRST RELIGION WAS BORN.

The first religion was born when the first men—like Gerald at the age of four—began to “mention” things they did not know.

Gerald, of course, could ask his father and mother and uncles and aunts and schoolmasters about the whys and whens and hows. But the first men, who had not long risen above the ape-man, and had just learned to chip flints, had nobody wiser than themselves to ask. And the wisest of them knew next to nothing. A very clever man would be able to chip flints better than his neighbours, or follow up the track of game more skilfully than other hunters, but he could not explain to them why the sun rose and set, or how the moon grew bigger and then smaller, or where the rainbow came from, or how people fell sick and died.

All he could do was to *guess*. Out of the first guesses came the first religion.

Now, we in our turn can only guess at these first guesses of our great-grandfathers. In fact, you may

wonder how we can have any notion of what was in the heads of men who lived hundreds of thousands of years ago, and who were not able to write their thoughts, even with a pointed stick on slabs of clay. But you have seen how the living amoeba helps us to guess what the earliest forms of life were like millions of years ago. And you know that the lowest savages, who are just a step or two above the animals, are very like what the first men must have been. So by studying the religion of savages we get a kind of pattern or sample of what the religion of the first men was like.

I do not need to tell you that savages are very ignorant. If they knew a great deal, they would not be savages! At the same time they are very easily frightened, just because they are ignorant. You remember I told you how terrified people used to be about a comet in the sky. It frightened them until they *knew* that it was only a wandering cloud of star-mist. In the same way an eclipse of the sun used to bring about a panic until people knew that it was caused by the moon coming in front of the sun, and so hiding it from us. Stories are told, too, of travellers who have scared savages by taking out their false teeth. The savages *knew nothing* about false teeth, so they thought that a man who was able to take his teeth out and put them back again must be a magician.

TO BE IGNORANT IS TO BE AFRAID.

Now, if you try and think of the life that our great-grandfathers of the Stone Age had to lead, you will see that they had plenty to scare them. The night must have been a terror to them, with the roar of wild beasts sounding through the forest, and with the eerie whisper of trees in the wind, sounding like the stealthy tread of an enemy. Thunder and lightning—so dreadful even to some of us—must have scared them out of their wits. The storms that burst upon them, tearing up trees, destroying their frail huts or flooding their caves, must have seemed like some tremendous power trying to destroy them. The silent enemy that struck them down with sickness must have been even more awful to them. And even harmless things like the noise of a waterfall or the echo from a hillside would fill them with fear.

The first men, like the savages of to-day, were ignorant.

The first men, like the savages of to-day, were afraid.

So it must have been in ignorance and fear that the first men began to guess about the why and how of things. And of all the things they were likely to guess about, the how and why of their own lives was the likeliest.

I remember reading a comical description of Adam's feelings in the Garden of Eden when he sneezed for the first time. He thought he was

going to explode ; and after it was all over, and he found himself holding together all right, he was very much puzzled about the whole business !

But the thing that must have puzzled the first men most of all was the end of life. What happened to a man when he died ? The body seemed the same as before, though it had stopped breathing and moving. What had gone out of the man to make the difference between a living man and a dead one ?

You can picture a man of the Stone Age crouching beside the body of a dead friend, calling to him, shaking him, touching the face that grows colder and colder. He gets no answer, and his puzzled eyes are full of wonder. By-and-by the night comes, and he falls asleep under his rough coat of animal skins, with his flint axe in his hand. He dreams of his dead friend. They go hunting together and kill their prey and eat it. Or they fight side by side against other men with flint axes. When the sun rises and wakes the sleeper he remembers his dreams ; yet there is his friend beside him, asleep for ever.

Knowing as little about dreams as about death, what does this great-grandfather of ours make of it ? In his simple way, he "puts two and two together." He knows that when he sleeps he can move in a shadowy world where he fights and hunts just as he does in the waking world. And he knows that in this shadowy world he meets men who have died. So he comes to think that there is

a something in a man that can leave his body when it sleeps and return to it when it wakes up. That "something," too, leaves a man altogether when he dies, and is not seen again except in the ghost-world of dreams.

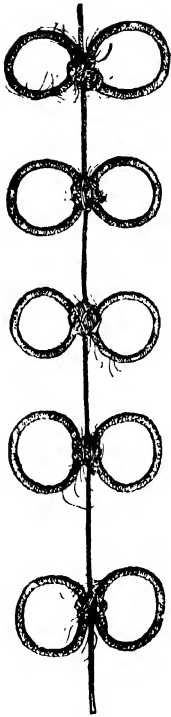
Here, right away, you get the notion of a soul or spirit which makes its home in the body and lives on after the body is dead.

SAVAGES AND SOULS.

Among all sorts of savages you will find a strong belief in such spirits. When savages gaze into a pool of water they see their "other self." When they see their shadow following them, they again see their "other self." (The Fijian, in fact, calls his shadow his "dark spirit.") When they hear an echo, they think a mocking spirit is repeating their words. They do not like to waken a sleeper, in case his spirit should be far away from his body.

In Borneo the natives think that when a man is very ill his soul must have left his body. So they call in a soul-catcher—not a doctor!—to find the soul and bring it back again. The soul-catcher fetches some article or other in which he says the lost soul has made its home. He rubs this article on the head of the sick man, and says that the soul has then come back to the sick man's body.

I expect that you have often read in books of travel about the way savages dislike having their photographs taken. Once, when a French doctor



SOULS are very real things to the savages. Here is a trap for catching the souls of enemies or sick men. It came from Puka Puka (Danger Island) in the South Seas, and is now in the British Museum. The souls were supposed to be caught in the nooses.



SPEARS and other things belonging to a dead man piled on his grave so that he may use them in the spirit world. The collection was found in British New Guinea, and is now in the British Museum.

photographed some natives of Madagascar, they said that he had taken their souls away! They were so upset at losing their souls that the doctor pretended to catch their souls in a basket and hand them back to the owners.

REAL GHOSTS.

The soul or spirit is, you see, a very real thing to the savage. It is something that can talk, and hunt, and fight. It is something that can eat and drink. It is something that can hurt him if he offends it. The savage does not think that the spirit of a dead man flies away to a heaven in the skies, quite different from the world it has left. He thinks that it stays near its old home (at least, for a time), and knows all that is going on.

Here is a story to show you how very real a spirit or ghost is to a savage. It is a story called "A Visit to the King of Ghosts," and it is told by the natives of Hawaii, in the South Seas. This is how the spirit goes off on its journey to the King of Ghosts:—

"The spirit of life crept out of the body, and finally departed from the left eye into a corner of the house, buzzing like an insect. Then he (that is, the spirit) stopped and looked back over the body he had left. It appeared to him like a massive mountain. The eyes were deep caves, into which the ghost looked. Then the spirit became afraid, and went outside and rested on the roof of the

house. The people began to wail loudly (because they thought the body belonging to this spirit to be dead), and the ghost fled from the noise to a cocoa-nut tree, and perched like a bird in the branches."

The rest of the story is just like a fairy-tale. The spirit flies from tree to tree until it comes to the door of "the world under the world," where the spirits live and the King of Spirits rules. The ghost of a sister meets it at the doorway, and leads it into the under-world, where they have great adventures. In the end the sister brings the spirit back to the body, and has to push it hard to get it into the body again!

Next time you read a ghost story, just think how you would feel if you thought every house was haunted! That is just how the savage feels. Ghosts to the right of him, ghosts to the left of him! He hears them in the whistle of the wind at night, in the rustle of leaves, in the noises made by hidden animals, in every strange sound. And because he is afraid of them he is very anxious to drive them away or to keep friends with them.

FEEDING GHOSTS.

I could fill a book with stories about what savages do to please or scare away the souls of dead people. But all I can do is to mention some of the things that will help you to see how a belief in souls grew into a religion.

Among savages, when a man dies, the relatives put food and drink and clothing on the grave for the use of the dead man's soul. In their simple way they think that 'the soul will need, in the spirit world, just the same things as a living man needs. If the dead man has been a warrior, they lay his weapons beside the food and drink and clothes.

Perhaps this seems a queer thing to do. But to this day, when a British soldier dies and is buried with "military honours," his helmet and sword are laid upon his coffin, and his horse is led behind the dead man in the funeral procession. So we do the same thing as the savage does! Our funeral customs have come down from savage customs, just as we ourselves have come down from savage ancestors.

There is, however, a still queerer thing about "military honours." Until about one hundred years ago, it was the custom in Europe to kill the soldier's horse and bury it in the same grave as its master. The horse was killed so that its spirit could serve the soldier's spirit in the world of ghosts.

Now, savages do the same thing. And if the dead man has been a great chief, they do a great deal more. They kill slaves to serve their master in his new life. If you have read about the Incas of Peru—those chiefs of an ancient South American race—you may remember that when an Inca died his slaves and favourites used actually to kill themselves at the graveside so as to be able to follow their master!

Other tribes were even more anxious to become ghosts. Among them the slaves killed themselves when their chief was dying, so that they could go before him and get his spirit house ready for him.

When India became part of the British Empire, the British Government was very much troubled by the strange custom known as *suttee*. Indians burn (or "cremate," as it is called) the bodies of their dead, and widows used to fling themselves on the funeral pyres of their husbands so that they could follow them into the other world. The Government passed a strict law against this custom, but even the fear of the law has not quite stamped it out. The spirit world is such a real place to the Indian women that they are ready and willing to kill themselves to get into it.

FROM GHOSTS TO GODS.

Although I have told you how the savage came to believe in spirits and the spirit-world, I have not said a word about savage gods. Even a savage religion, you may tell me, must have gods to pray to and to worship. How, then, did the savage come to believe in gods?

It may seem to you a big jump from a ghost to a god, but if you had a chat with a savage you would find that it is not a big jump for him. Any very powerful spirit is a god to a savage. He admires it and fears it. He prays to it to send him luck and to do him no harm. He offers gifts or sacrifices to



Here are two War-Gods from the Hawaiian or Sandwich Islands. They are made of red feather work, and look very fierce. You can see them now in the British Museum. The Hawaiians were a very warlike people, and so worshipped War-Gods.

it so as to please it. And he calls in the help of priests, who say that they are able to get special favours from the god.

If you think this over, you will see that spirits may become gods as simply as acorns become oaks.

Suppose that the chief of a savage tribe dies. Suppose that he was a great chief, who struck terror into the hearts of the tribe. After he is dead his spirit will be just as much feared as the living chief was. You may be sure that the offerings on his grave will be plentiful, and that the tribe will be always begging the spirit of their chief to fight for them, and not to be angry with them. The spirits of ordinary men will count for nothing when a great warrior-spirit is roaming around.

In that way the tribal chief may grow into the tribal god. When the tribe goes into battle, the fighters will call upon the spirit of their dead chief to lead them to victory.

HOW MEN BECAME GODS.

If you find it difficult to believe that a man can become a god, you can take a journey (with the help of books) to India. There you will find a sect worshipping the spirit of General Nicholson, a great soldier who was killed at the storming of Delhi. In the south of India you will find another sect worshipping the spirit of a Captain Pole. Go further east—into China—and the Chinese will tell you how the Emperor of China, only eight years ago, issued

a decree raising Confucius—a great Chinese teacher who lived five hundred years before Christ—to a place equal to that of the dead Emperors themselves, who are all gods. And in one of the islands of the New Hebrides you will find natives whose word for *god* means “a dead man.”

Our friends the Japanese give us another example of how easily men can grow into gods. The Japanese worship the spirits of their ancestors. In the year 1905, when Japan was at war with Russia, the famous Admiral Togo solemnly addressed the spirits of sailors and soldiers who had fallen in battle, and thanked them for the help they had given in winning victories.

ANIMAL SPIRITS THAT BECOME GODS.

The story of religion would be much simpler than it really is if the spirits of dead men were the only things that people made into gods. You and I would get to the end of this chapter very quickly if all we had to do was to watch how the ghosts of men became spirits so mighty that people prayed to them; how each tribe came to have its own god, and how the notion of many gods grew into the notion of one mightiest god for all tribes and all the world.

But the savage does not stop at human ghosts. He thinks that every living thing has a spirit just as man has a spirit. *

Here again he “puts two and two together” in



Here is a "Bogey Man" from the Nicobar Islands. It is a wooden figure to scare away evil spirits.

his simple way. Man has a spirit; so also must the ape, the pig, the tiger, and all the other animals that eat and grow and have young ones and die, just like men. Does he not meet these animals in his dreams when he visits the spirit world? Are not some of them so mysterious in their habits that they seem like ghosts? Think of the serpent wriggling unseen through the grass—the serpent whose bite is death. Think of the animals that prowl unseen in the dead of night. Think of the lemurs, whose very name means “ghost”!

So everything that was alive came to be looked upon as having a spirit. If you asked a savage how he knew that a thing was alive, he would tell you “because it moves.” A live man moves; a dead man is still. A live monkey moves; a dead monkey is still.

But any savage can see that men and animals are not the only things that move. Trees swing their branches, and push out leaves and fruit. Water moves with a rippling or a roaring noise in river or waterfall. Clouds move across the sky, changing shape as they go. The air moves, buffeting people and breaking down trees, just as a man knocks another down with a stone hammer. The sun moves; the moon moves, besides getting bigger and smaller; the stars come and go. Even the earth sometimes moves under him, and volcanic mountains pour out steam and melted rock.

Once more the savage “puts two and two together.” He says to himself: “Everything that

lives moves." Then he says: "Everything that moves must be alive." And because the spirit in a man is the thing that keeps him alive and moves him, every moving thing must be, like man, a home for a spirit.

NATURE GODS.

The savage, you understand, does not see so much difference as we do between a man, a tiger, and a waterfall. They are all "alive." And what is more, he fears the spirit of the tiger and the spirit of the waterfall just as much as he fears the spirit or ghost of a man. It is something unseen, something that can come upon him at any time and hurt him. So it comes about that he prays to these other spirits not to harm him. He makes presents or sacrifices to them, so as to please them. In these and other ways he makes gods of them.

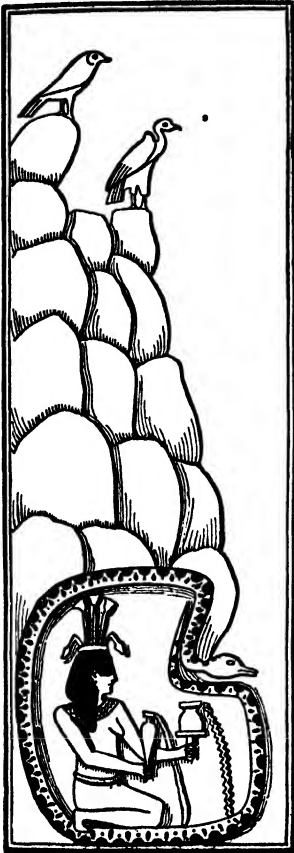
I could give you a long list of these "nature gods" that savages have worshipped—a list so long that you would yawn with weariness before you had read half of it. Here are just a few samples picked out from the list:—

In ancient Egypt bulls, serpents, cats, crocodiles, hawks, beetles, and many other animals were worshipped. The serpent has been adored as a god in almost every part of the world.

In India bulls are sacred. In the West Indies, in Borneo, and in the Philippine Islands the natives do not like to cut down certain trees because of the spirits that dwell in them. The Siamese offer food



ANCIENT GREEKS worshipping the Serpent, which was looked upon as a god in many countries.



The Ancient Egyptians had a River God—the Nile God, who is shown in this old picture in his cavern pouring out the water. You will see that he is pouring out two streams, one for the Blue Nile and the other for the White Nile.

to a tree before they fell it ; and the Austrian wood-cutter says " I beg your pardon " to a tree before he swings his axe at its trunk.

River gods are common ; and among some savage people it was believed to be wrong to save a drowning person, because the river god would be cheated of his prey. Remember, too, all the sacred springs and holy wells that are still believed to have magical powers in curing diseases. The Ganges is a sacred river to the Indians.

In many parts of the world stones are worshipped. There is the Black Stone at Mecca ; Mohammedan pilgrims travel hundreds of miles to worship it. Again, the Kings of England are still crowned upon an ancient stone which is supposed to have some special " virtue " or power. Mountains have been

worshipped. Fire has been worshipped. In Roman Catholic churches to this day lamps are kept always burning. Bonfires were once lit as a religious act.

The moon, the stars, and above all the sun, with its glorious light and warmth, have been objects of adoration to many races. At one time or another in Peru, in Mexico, in Egypt, in Persia, in China, in Greece, in Rome, and in other countries, the sun god has been worshipped.

THE GREAT SUN GOD.

If you were a savage, which god would you choose out of this list of nature gods? I expect you would choose—as I certainly would choose—the sun god. Why? Because the sun god brings the earth to life again after the cold death of winter; it brings the flowers and the fruits, the leaves and the golden grain.

Our savage great-grandfathers would feel this even more than you or I, because they had no comfortable, well-lit, and well-warmed houses to spend the winter in, and they would often starve for want of the food that the sun brought with it. So it is not surprising to find that many ancient races held a religious festival at mid-winter, when the sun touched the lowest point in the heavens. They rejoiced in the birth of a new sun that would grow in strength every day until it warmed the world and made it bright and happy again. This mid-winter sun festival remains with us in the shape of Christmas Day.



THE BULL was one of the sacred animals of ancient Egypt. This is an imago of a Bull which was worshipped. It is now in the British Museum.

WHERE DID ALL THE RELIGIONS COME FROM?

In what I have told you about savage and other religions, the question is more than half answered. You have seen how savages came to believe in ghosts or spirits, and how the more powerful spirits came to be feared and worshipped as gods. And you have seen how these spirit-gods were connected with men, animals, trees, water, stones, mountains, fire, moon, stars, and sun.

With such a crowd of spirit-gods everywhere, it is no wonder that there was a crowd of different religions. Each savage race had its own ideas about the spirits that were the most powerful. To these they offered sacrifices; to these they prayed for help; to these they built temples; and in their honour they held services. The tribal religion was, in fact, part of the tribal customs. Just as each tribe had its own customs, so it had its own religion, its own god or gods.

It may seem queer to you that men should worship a crowd of gods. You are told in school and in church that there is only one God, who made the world and rules everything that goes on upon it. It is to this God that people pray, no matter what they want. When a savage wants victory in war, he prays to the war-god of his tribe. When he wants rain to make his crops grow, he prays to the rain-god. When he falls sick, his friends appeal to the evil spirit that sends disease. But, on our side, when we want victory,

or rain, or health, or anything else, we pray to the one God. In fact, the British and the Germans both prayed to the same God to send them victory in the Great War.

How, then, did the notion that there were many gods grow into the notion that there was only one God?

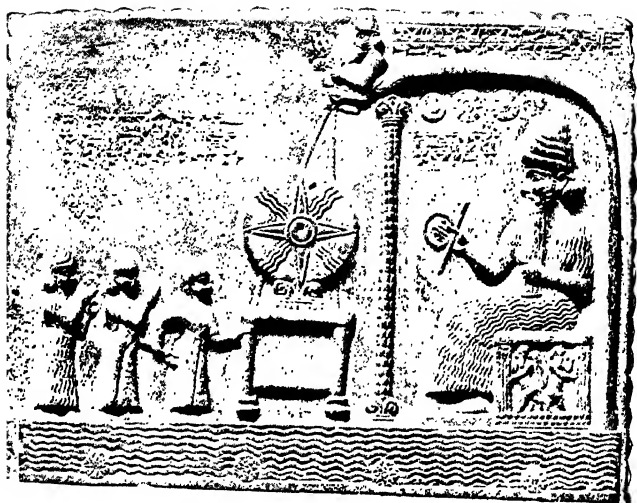
It grew just as one kind of animal changes into another kind—little by little, and bit by bit.

FROM MANY GODS TO ONE GOD.

Although the savage prayed to many gods, he did not put them all on the same level. Some were much higher than others; they were stronger or more terrible. Besides, you have seen that some of the native-gods had only one kind of work to do—like sending rain or keeping sickness away. And when you remember that savages were continually fighting, you can easily believe that the most important of all their gods was the one that led the tribe into battle and brought it victory.

Very often an animal was the token of this tribal god. Many savage tribes, as I have told you before, believe that they have come from a snake, or a shark, or some other animal. They call themselves after this animal, much as the Boy Scouts call their patrols after the wolf or the bear.

The ancient Greeks and the ancient Romans believed in a whole family of gods. Most of their gods had grown out of nature-gods, such as sun-



THE "SUN-GOD TABLET," which was made in Babylon about 820 years before Christ, and is now in the British Museum. It shows the Sun-God in his shrine (on the right). In front of the shrine is an altar with the disc of the sun upon it. The first of the three figures worshipping the sun is the High Priest of the Sun-God. The second is the King of Babylonia. The High Priest is leading the king by the hand. The third figure is an attendant goddess. You will see that she is holding her hands up very much as we do in prayer.

gods, earth-gods, star-gods, and so on. But at the head of the Greek god-family was Zeus ; and at the head of the Roman god-family was Jupiter. And in the legends about these gods we read how Zeus or Jupiter used to interfere with the doings of the other gods, and put his foot down very firmly when they did not behave themselves.

GOOD GODS AND BAD GODS.

Perhaps you are a little bit surprised at the idea of gods misbehaving themselves. But you will soon find that there are bad gods as well as good gods. And even the good gods of ancient Greece or Rome were just like very big men and women. They could do many things that ordinary men and women could not do, but they were not always good. They got into rages ; they told lies ; they stole from each other ; and they cheated each other. In fact, the Romans and the Greeks made their gods like themselves—partly good and partly bad. They made their gods “in their own image.”

Other ancient races did much the same thing with their tribal gods. These gods behaved just like very big men. Even in the Old Testament you will read how Jehovah, who was the tribal god of the ancient Jews, walked in the Garden of Eden in the cool of the evening, and talked to Adam and Eve much as an ordinary father would talk to a couple of children. Later we are told that Jehovah was pleased with the “sweet savour” of burnt

offerings. Jehovah, too, is described as a jealous God, who gets very angry when his people disobey him or worship other gods.

There is, in fact, a great deal in the Old Testament about how wrong it is to worship false gods. Baal was one of them. Jehovah was a rival to these other gods; and the Jews were always being told that if they were not true to Jehovah they would not win battles or have any luck.

Jehovah, then, was only one among many gods. The Jews did their best to get Jehovah chosen as the one god of the Jews and as greater than the gods of other tribes. When the Jews conquered a tribe they tried to get that tribe to bow the knee to Jehovah. Later on, when one nation conquered another, the conquered nation had to swear to obey the king of the conquering nation.

Jehovah was a kind of spirit-king of the ancient Jews, and he was supposed to lead them in war just as ordinary kings did in later times. And in the Old Testament (Judges i, 19) you come across the curious fact that Jehovah, like an ordinary king, did not always win the battle. He helped the Jews, under Judah, to drive out the inhabitants of the mountains, but he "could not drive out the inhabitants of the valley, because they had chariots of iron."

"OUR" GOD AND "THE" GOD.

The Old Testament tells the story of how the



MOON-WORSHIP in ancient Babylon. This is a clay picture which is now in the British Museum. It shows the King of Ur being led into the presence of Sin, the Moon-God. This king lived about 2,500 years before Christ.

rival gods were one by one put aside, leaving Jehovah alone. It tells about all that Jehovah did for the Jews; and it tells the Jews that they were the Chosen Race, meaning that they were the people helped by the one true God. This is the reason why the Jews keep so much to themselves, eating special kinds of food, having special feast days and fast days, and refusing to marry people who are not Jews.

All the same, the fact that they thought *their* god was *the* god did not prevent the idea of only one god being taken up by other races. When people in church sing the hymn, "Before Jehovah's awful throne," they do not mean the Jewish tribal god who walked in the Garden of Eden, who was seen by Moses on the mountain, and who could not manage to get the better of people with iron chariots. They are using the word "Jehovah" to mean the God who grew out of the Jehovah of the ancient Jews. The new Jehovah is not the god of the Jewish race, but of the whole human race.

ACORN RELIGIONS AND OAK RELIGIONS.

I have told you in a few lines about a change that took hundreds and hundreds of years.

It was only by very slow steps that people rose from the notion of man-spirits and nature-spirits to the notion of spirit-gods, and from the notion of spirit-gods to the notion of one all-powerful God. Just as we ourselves have come down through the

ages from savage ancestors, so our religions have come down from the religions of our great-grand-fathers. Some races, you have seen, have not got past the stage of believing in man-spirits and nature-spirits. They are still savages. Others have got on further, and come to believe in several gods. The most civilized races have gone further still, and believe in only one great Spirit.

When you are older you will be able to read, in the history of religions, how the acorn-religions sowed by the ignorant savages grew into the oak-religions of civilized people. But it is quite easy to find, even in the highest religions, signs that they grew out of the lower religions.

In the Christian religion you have really more than one God. You have the three Gods of the Trinity—Father, Son, and Holy Ghost. Besides, there is the Devil—Satan—who, though not a god that is worshipped, is yet spoken of as a mighty Spirit of Evil. And the Roman Catholics worship Mary, the mother of Jesus; and they pray for special benefits to hundreds of saints, who are all powerful spirits. Some of these saints have special shrines, where they are most easily approached. Or they are represented by sacred images, to which people will bring offerings of jewels and money in the hope that the gift will bring the help of the saint.

When you think of these things, and then reflect how they remind you of the savage with his sacred trees and stones, and his idols before which he lays



This is an ancient block of ivory carved to represent a Sacred Tree. It is a relic of Assyria, and is about three thousand years old. It is now in the British Museum.

To face p. 178.

sacrifices, it is not difficult to see that religious customs have been handed down to us from the savages of long, long ago.

GODS OF EVIL.

Talking of Satan reminds me of another thing that shows that the higher religions have come from the lower. The savage believes in evil spirits as well as in good spirits. In fact, as I told you before, he is terribly afraid of nearly all spirits, and is more ready to believe that they will do him harm than good. Most of his prayers and sacrifices and religious rites are meant to coax spirits not to hurt him.

So it comes about that in the lower religions far more attention is paid to the gods of evil than to the gods of good. In ancient Egypt the chief gods were Osiris, the good god, and Set, the evil god. Set was worshipped far more than Osiris. Osiris, you see, had a kind heart, and could be left alone. Set, who could send disease, bad crops, drought, and death, was made a fuss of to keep him in a good humour.

If you think this funny, just remember how much more careful you are to please a teacher who has a bad temper than one who is easy-going and does not punish you!

When people came to believe in one god instead of many gods, some of them, like the ancient Jews, thought that the one god sent evil as well as good.

But other people did not get quite so far. They came, like the Persians, to believe in one great spirit of evil and one great spirit of good.

The Persians think that Ormuzd, the god of light or good, is always at war with Ahriman, the god of darkness or evil. In that simple way they explain why there are both good and evil in the world. And the Persian religion teaches that every one ought to join in the fight, by helping to kill evil and do what is good.

MIXED RELIGIONS.

Have you ever eaten loganberries?

"What," you may ask me, "have loganberries to do with religion?" Not very much, perhaps; but they help us to understand how one religion can borrow something from another.

The loganberry is got by "crossing" a blackberry with a raspberry. This gives a plant with the raspberry bush as one parent and the blackberry bush as the other parent. The result is a berry that is neither a raspberry nor a blackberry, but like both of them.

Now it so happened that when the ancient Jews were captives in Babylon they lived among people who, like the Persians, believed in a spirit of evil. Before that time, as I have just told you, the Jews thought that their tribal god sent both good and evil. But they borrowed the notion of a separate spirit of evil and "grafted" it on to their religion.

■



The larger figure is the ancient Egyptian man-god Osiris, who rose from the dead and became King of the Other World—the world that souls go to after the body dies. The smaller picture shows how Set, the god of evil and the enemy of Osiris, was drawn by the ancient Egyptians. Set was supposed to take the shape of a gazelle. The drawing shows the long nose and the horns of a gazelle.

That is how the Devil came into the Jewish religion. And as the Christian religion grew out of the Jewish religion, we find that the Christian religion, like the Jewish religion, has a Devil as well as a good God.

THE STRANGEST THING IN RELIGION.

This is already a very long chapter, but I have not been able to tell you more than a little about where religions came from, and how they grew and changed as men got wiser. When you are a little bit older you will be able to read more about them in books like the *Childhood of the World*, by Mr. Clodd. And when you are grown up you will come across hundreds of big books on the same subject.

I would like, before going on to talk about the Bible—which is the book that tells us about the Jewish and Christian religions—to say more about one of the strangest things in religion.

You will remember that savages are in the habit of putting food and drink on graves for the use of the spirit of the man buried in the grave. You will also remember how widows killed themselves and slaves were slain so that their spirits could follow the dead into the spirit world.

Out of these offerings of food and lives grew the religious custom of “sacrifice.” (A sacrifice is something offered or given up.)

When the dead man was a great chief, the offerings at his funeral were always very large, and

the number of slaves killed in his honour was also very large. And if his spirit was worshipped as a god, the people would not be content with the offerings and sacrifices at the funeral. They would repeat them at various times, and especially when they thought the departed spirit was angry with them. Also, if they wanted to ask the spirit for some favour, they would bring special offerings to please the spirit.

HUMAN SACRIFICES.

Now, the greatest thing that any one can offer is a human life. You may find it hard to believe that people would actually kill others to please the gods, but in ever so many old and savage religions you find that human sacrifices were quite common.

Julius Cæsar told us that the Gauls, for example, followed this custom. "In times of war or danger," he wrote, "they either sacrifice human victims or make vows that they will do so; for they think it is not possible for the gods to be appeased unless one man's life is given for another's."

In some tribes it was the custom to eat the human victim. This is the queerest and most horrible part of all, but there was a reason for it.

Most people think that savages eat human flesh because other food is scarce. The truth seems to be that they turn cannibal, not because they are starving, but *because they think that eating a man's flesh gives them some of the man's strength.*

Some savages, when they kill a great fighter in



Terra-cotta figure of an ancient Babylonian Demon or Evil Spirit. This figure is now in the British Museum.

battle, drink his blood so that his valour may pass into them.

Now, in an old book about the ancient people of Mexico you will find the following sentence, which I give you with all its quaint spelling :—

The ancient Mexicans “tooke a captive, and afore they did sacrifice him unto their idolls, they gave him the name of the idoll to whom hee should be sacrificed, and apparelled him with the same ornaments like their idoll, saying that hee did represent the same idoll.”

Why did they do this? Perhaps you will be able to guess the answer if you remember the cannibals. To eat a man was to get something of the man's strength; and if the man was dressed like a god and was called a god, to eat him was to get something of the god's strength.

All those who ate the sacred victim's flesh or drank his blood became more like their god. It is this custom that is described as “eating the god.”

I think you will agree with me that only the most savage and brutal people could stand this killing of men and women as part of their religion. When they grew wiser and better they would try some other way of pleasing their gods. The first step upwards was to put an animal in place of the human being.

Abraham, you will remember, was ordered by Jehovah to offer up his own son Isaac as a sacrifice. At the last moment Isaac was spared, and Abraham was allowed to kill a ram in his place. (The ram,

by the way, was a sacred animal among the Egyptians, and was slain in honour of one of their gods.)

So the use of animals as victims was an easy step to less terrible ways of getting into touch with a god than by killing human beings. Later on, instead of "eating the god" by swallowing the flesh and blood of a human or animal victim, men took to eating bread and drinking wine, which were looked upon as the flesh and the blood of the god.

So we come to the "communion service" of the Christians. That service, you see, has grown out of a religious custom that began thousands and thousands of years ago among our savage great-grandfathers.

THINGS WE HAVE LEARNED.

Here are some of the things we have learned about religions in this chapter:—

There are hundreds and hundreds of religions in the world.

We can tell what the first religions were like by learning about savage religions.

Savages believe in spirits or ghosts which leave a man for a time while he is asleep, and leave him altogether when he is dead.

Savages think that the spirits of dead men are real things that can hurt us and bring bad or good luck. So they offer gifts to the spirits and pray to them for help.

The spirits of great chiefs were supposed to be the strongest spirits. They were worshipped as gods.

Animals, trees, waterfalls, stars, the sun, the moon — indeed, everything that moved — was supposed to have a spirit.

Out of the notion of many gods grew the notion of one great God for all the world.

In some religions the one God sends evil as well as good. In others there are one good God and one bad God.

All our religions have grown out of old religions, just as the oak grows out of the acorn.

CHAPTER VIII

WHERE DID THE BIBLE COME FROM?

WHERE did the Bible come from?

I can remember the day when I first asked myself how the Bible came into the world. I was very young—younger, perhaps, than you are now—and I was sitting in church. Instead of listening to the sermon, I was turning over the leaves of my Bible, and I came to the "Dedication."

If you will look at the Dedication, which comes before the Book of *Genesis*, you will find that grace, mercy, and peace are wished to the most high and mighty Prince James by "the translators of the Bible." "Translators" was a big word, but, as I had had French lessons at school, I knew what it meant. It meant that some people had turned the Bible from some foreign language into English. *Our Bible* was not the *first Bible*.

This was a surprise to me. Somehow or other I had got the notion into my head that the Bible had been in the world for ever and ever. I supposed it had come down from heaven in the same way as Moses got the Ten Commandments on tablets of stone. My notions, you see, were very hazy!

Later on I looked at the title-page of the Bible,

and read that it had been "translated out of the original tongues, and with the former translations diligently compared and revised by His Majesty's special command,"

So I found out that there had been other translations of the Bible, some of them not so well done as this one "by His Majesty's special command." And I wondered, too, what were the "original tongues" in which the Bible had been written.

If our Bible had come from other Bibles, and those other Bibles from some other Bibles, what was the first Bible like?

WHAT WAS THE FIRST BIBLE LIKE?

I am afraid that I did not think very much about this question until I began to grow up. Perhaps it is as well that I did not worry about it when I was a little boy at school, because it is a very hard question to answer. Hundreds of wise men have tried to answer it. Hundreds and hundreds of books have been written about it. And to this day nobody really knows what the answer is!

One reason for this is that the first Bible must have been very, very old. It was like an animal that lived and died long, long ago, and left no fossil bones to tell us about itself. Just as there are pages missing from the Stone Books, so there are many pages missing from the Story of the Bible.

Now, when you read a book with a lot of pages missing you get annoyed. You want to read the

whole story, or none at all. But the funny thing about the Story of the Bible is that the missing pages make us all the more curious to find out about it. They make it a puzzle, a mystery. Once you start wondering about where the Bible came from, you go on finding out a little bit more, and a little bit more, but you never stop wondering.

All I can tell you in this chapter is a little of what has been found out about how we got our Bible.

WHAT IS THE BIBLE?

The word "Bible" really means "book." People in Scotland often talk of the Bible as "The Book." All the same, they would be nearer the truth if they said "The Books." The Bible is a heap of books, written by different people at different times, and gathered together years and years afterwards.

How do we know this? Well, you can find out for yourself, if you like, that the Bible is made up of many books by different people. Read some of the Book of *Kings*, and then some of the *Song of Solomon*; they are so different from each other that the same man could not have written both of them. Again, they are both different from *Matthew*, *Mark*, *Luke*, and *John*. And the Book of *Revelation*, with its "great red dragon, having seven heads and ten horns, and seven crowns upon his heads," and many other queer things, is quite different from all the other books in the Bible.

Now, although I have told you how one kind of

animal can change little by little into another kind of animal, one kind of book does not change in the same way into another kind of book. Books, you see, do not have children! So, when you find a book with different parts written in different ways, you can tell that many people have had a hand in it. Just as no two people talk or walk or even cough in quite the same way, so no two people will tell a story in quite the same way.

When your class at school writes an essay on a visit to the British Museum, every boy or girl uses different words in his or her own special way. And your teacher, if he is really clever, can tell who wrote each essay, without looking at the name. He will say: "That is the way Gerald describes what he has seen"; or: "That is Helen's way of telling a story."

DO YOU KNOW WHO WROTE THIS?

Just to show you how this comes about, I will give you a few sentences from three famous books that I expect you have read:—

I

"Then Sir Lancelot, ever after, eat but little meat, nor drank, but continually mourned until he was dead; and then he sickened more and more, and died and dwindled away. For the bishop, nor none of his fellows, might not make him to eat, and little he drank, that he soon

waxed shorter by a cubit than he was, that the people could not know him."

II

"As soon as I saw them shipped and gone, I took two guns upon my shoulders, and two pistols in my girdle, and my great sword by my side, without a scabbard, and with all the speed I was able to make went away to the hill where I had discovered the first appearance of all; and as soon as I got thither, which was not in less than two hours (for I could not go apace, being so loaded with arms as I was), I perceived there had been three canoes more of savages at that place; and, looking out farther, I saw that they were all at sea together, making over for the main."

III

"First came ten soldiers carrying clubs; these were all shaped like the three gardeners, oblong and flat, with their hands and feet at the corners: then ten courtiers; these were ornamented all over with diamonds, and walked two and two, as the soldiers did. After these came the royal children; there were ten of them, and the little dears came jumping merrily along hand in hand, in couples; they were all ornamented with hearts."

Now I am sure that you will see that I, II, and III come from quite different books. And I expect

you will be able to guess that III comes from *Alice in Wonderland*, and II from *Robinson Crusoe*, and I from *Morte d'Arthur*. But if you knew nothing about any of these books, or the men who wrote them, you would still be able to say that I and II and III had different authors.

So, when we find a book like the Bible with many different ways or styles of telling a story, we know that many different men helped to write the Bible. The next thing we have to try and find out is who these men were, and when they wrote their parts of the Bible.

WHO WROTE THE BIBLE?

Here, again, the answer is, "Nobody knows." Nobody knows who actually wrote any one of the many books of the Bible. Even though a book is said to be "The Gospel according to St. Matthew," we cannot be sure that St. Matthew wrote it. Even though a book is called "The Epistle of Paul the Apostle to the Romans," we cannot be sure that Paul himself wrote it. It may have been written by some one who heard Paul preach, or by some one who had been told about Paul's preaching. Some people think that Paul did write this and other Epistles; other people think he did not.

Now, you may ask me how we can tell who wrote a book that is hundreds of years old. How, for example, can we tell that Thomas Malory wrote *Morte d'Arthur*?

Well, it so happened that *Morte d'Arthur* was one

of the first books to be printed in England. It was printed by a famous printer called Caxton, in the year 1485. And at the beginning of the book Caxton tells us that the manuscript from which the book was "set up" in type was given to him by Sir Thomas Malory, Knight. At the end of the book Malory himself tells us that he finished writing *Morte d'Arthur* in the ninth year of the reign of King Edward IV.

These are some of the things that help us to know that Malory wrote *Morte d'Arthur*. But Malory also tells us that he found the stories in some French books. He helped himself to these books, and wrote the stories in English. The stories themselves are all legends of the Court of King Arthur, and they were handed down from the days when printing was not invented, and when stories were passed from one man to another by word of mouth, or written out by hand.

In those days there was no way of making copies of a book except by writing them out. The "books" of those days were "manuscripts"—a word which means "written by hand."

THE "MANUSCRIPTS" OF THE BIBLE.

So we know that Malory wrote *Morte d'Arthur* because he handed the manuscript to Caxton, who set it up in type and printed hundreds of copies. Some of the books actually printed by Caxton are preserved in the British Museum and other museums.

But the books of the Bible were all written hundreds of years before printing was invented, and *all the early manuscripts have been lost.*

Well, you will say, what does that matter? If we have copies of the early manuscripts, we need not worry about the early ones being lost.

When I was at school I sometimes had to write out passages from a book, perhaps as a punishment. I used to think it a very easy thing to do. And so it was—in a way. But I very seldom wrote it out exactly as it was in the book, with no word wrongly spelled, with every comma, every full stop, every capital letter, and everything else just right. Mistakes *would* creep in.

Let us suppose that I handed my copy to the boy next to me, and asked him to copy my copy. He would put in some of my mistakes, and make some mistakes of his own as well. And if he gave his "manuscript" to a third boy to copy, the third boy would make some more changes on his own account.

That is very much what happened to the early manuscripts of the Bible and other old books. Every time they were copied they were changed a little, and after they had been copied hundreds of times the last copy would be very different from the first. If the first manuscript had been kept, one could correct the mistakes in the last manuscript by reading the first and last side by side. But if all the early manuscripts were lost, we could not be at all sure what was written by the man who first told the story.

PATCHWORK MANUSCRIPTS.

We would be still less sure about the first story if the men who copied it out had not been content just to imitate the manuscript before them. When you borrow a book from the Public Library you often find that people have scribbled remarks about what the author has written. There is a rule against this scribbling, but some people are so fond of putting in a word or two of their own that they give no heed to the rule.

In olden times the men who copied manuscripts used to do the same sort of thing. They would put in sentences of their own, and these sentences would be copied by the next man as part of the first story. Perhaps the next man would add some wise things on his own account, or put in some story that he had heard; and so things would go on until the manuscript became a patchwork of old bits and new bits by different men.

OLD STORIES ABOUT THE WORLD.

In the last chapter I told you how the notions about spirits and gods and the next world grew up among savage races. Our great-great-grandfathers believed in spirits and gods and the next world before they were able to write. They told each other about these things, and about how the world was made, and how the first man and woman were made. You may be sure, too, that they did not all

tell the story of these things in the same words and in the same way.

When somebody tells you a tale and you repeat it to somebody else, it is very difficult for you to give it word for word as it was told to you. You cannot remember it all "by heart," and perhaps you think you can make it a better story by adding a little bit of your own to it. So a story passed from one to another by word of mouth changes more quickly than a manuscript that is copied.

Let us go back, then, to the days when writing was first invented. Different men would write down the story of how the world was made, and they would write it down as *they* had heard it. Later on some man who could write would find these different stories about the same thing. What would he do? He would either choose the one he thought best, or he would make a patchwork of the manuscripts before him.

This is what seems to have happened with some of the books of the Bible. You will remember (page 47) about the two stories in *Genesis* of how the world was made. These two stories have been patched together in the book called *Genesis*. Again, the story of Noah and the Ark is really two stories joined together. In one story (*Genesis*, ch. vi) Noah is told to take two of every kind of living animal into the Ark. In the other story (*Genesis*, ch. vii) Noah is told to take seven of the "clean" animals and two of those that were "not clean."

WHERE ARE THE OLDEST BIBLE MANUSCRIPTS?

From all this you can see that the books of the Bible had many adventures before they were gathered together and "fixed" in the Bible as we know it. They came from different places and at different times; they were copied, and altered, and patched together, and added to, time and again during hundreds of years. Many wise men have spent their lives trying to find out where the different books came from, when they were first written, and how they were changed. And it would take you many years to read all that these wise men have written about where the Bible came from.

If you could ask me a question now, I think I know what it would be. It would be the same question as I asked when I got to know a little about the story of those old manuscripts. The oldest were, as I told you, lost—perhaps for ever. What about those that did *not* get lost. Where are they now?

There are two answers to this question—one for the Old Testament, and the other for the New Testament.

OLD TESTAMENT MANUSCRIPTS.

The Old Testament contains the sacred books of the Jews. It tells about the ancient history of the Jews, how Jehovah led them out of bondage, helped them to fight battles, and punished them when they

were wicked. It gives the history of many Jewish kings and priests.

The language in which these sacred books were written was Hebrew, and the earliest Hebrew manuscript of them is about ten hundred years old. Does that seem very old? Perhaps it does, but you must remember that ten hundred years ago means about ten hundred years *after* Christ, and the Old Testament tells us about what happened many hundred years *before* Christ came into the world. So ten hundred years is not so very long ago, after all.

Now, there is a very curious thing about this old Hebrew manuscript. There are many mistakes in it, and all these mistakes have been faithfully copied in all the later Hebrew Bibles.

It seems funny that people should copy mistakes so carefully—just as funny as that a Chinaman should copy all the patches and holes in a pair of trousers when he is asked to make a new pair like the old. But the reason is the same for the Hebrew Bible as for the pair of trousers. The Chinaman thinks it is his duty to make a new pair *exactly* like the old. In the same way the Hebrew “scribe,” as their writers were called, was told that the book he was copying was sacred, and must be copied *exactly*. So he wrote it out with all the mistakes he saw in it. And everybody after him has done his best to show, by his care with these mistakes, that he was doing his sacred duty.

The scribes, however, did not always take so much care. There was a time when the manu-

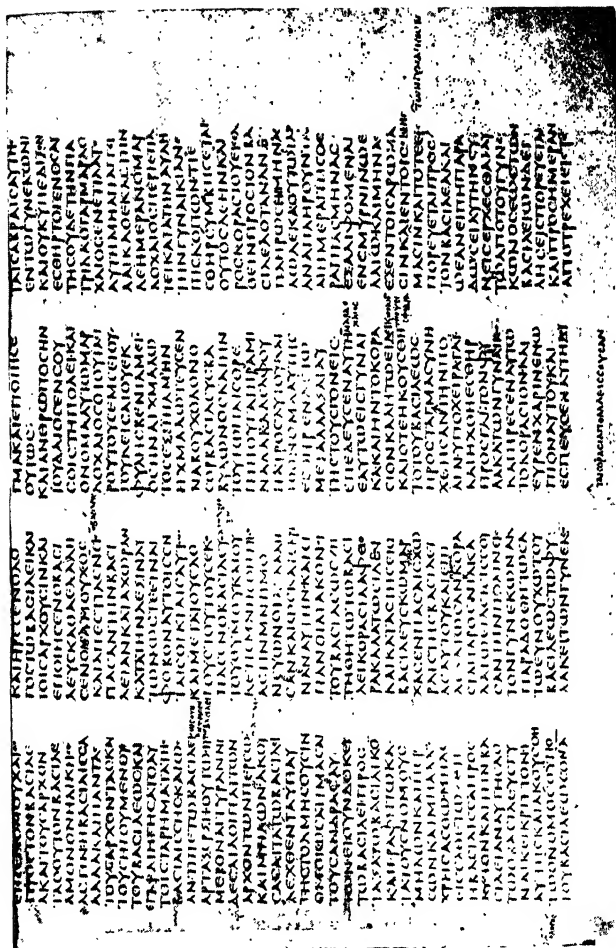
scripts were changed and patched in the way I told you about. The change came when—perhaps about five hundred years before the date of the earliest manuscript that is still preserved—certain copies were chosen by the Jewish priests as the best copies of the sacred books. Some people think that one copy only was chosen as the one to be followed.

After that time no one was allowed to change anything, even to the smallest letter. To make things more sure, the scribes used to write down how many verses there were in each book, how many verses began with a certain letter, and so on. They did everything they could to keep other scribes from making mistakes or from altering the words of the sacred story.

I may tell you one thing which shows that the Hebrew Bible is only one of a number of old copies of the Hebrew sacred books. A long time before the date of the ten-hundred-year-old manuscript the Hebrew Bible was translated into Greek, and also into Latin. These Latin and Greek translations are different in many ways from this Hebrew manuscript, showing that they were taken from some other Hebrew manuscript.

NEW TESTAMENT MANUSCRIPTS.

Now we come to the New Testament, which was written in Greek. Here, again, all the first copies have been lost. The oldest copy, which lies in the Vatican Museum at Rome, was written about three



This is a photograph of a bit of the oldest Bible manuscript in the world—the “Codex Sinaiticus.” It was written in Greek. Here and there you will see small letters, which are corrections put in by the man who wrote this ancient manuscript.

or four hundred years after Christ. This is only a guess, because the manuscript has no date on it. And it is very different from the New Testament we know, because it does not contain the Book of *Revelation* or *Hebrews* and some of the Epistles of St. Paul.

This manuscript has lain in the Vatican Library for four or five hundred years. But another very old copy, which has all the books of the New Testament, was discovered forty years ago in a convent of the Greek Orthodox Church at the foot of Mount Sinai. A German named Dr. Tischendorf, who was visiting this monastery, saw in the middle of the great hall a basket full of old parchments. (In olden times, you know, people used to write, not on paper, but on dried skin, which is called parchment.) He looked at these parchments, and found that they were a very old Greek copy of the Old Testament. He was allowed to take away some of the sheets, but the monks refused to let him take any more.

Later on he went back to the convent, but got no more than a single sheet of the Book of *Genesis*. Fifteen years later he went back again, and with the help of the Emperor of Russia he managed to get hold of the rest of the parchments. The whole collection is now in the library at Petrograd.

Still another old New Testament was given to Charles I by Cyril Lucar, Patriarch of Constantinople in the year 1627, and is in the British Museum. A fourth is in the Royal Library at

Paris; and a fifth was presented to Cambridge University in 1581 by Beza, a friend of Calvin.

THE FIRST ENGLISH BIBLE.

I have not troubled to tell you much about these old New Testament manuscripts, because *not one of them was used by the men who gave us our English Bible*—I mean by the “Translators of the Bible” in the reign of King James I. There were fifty-four of these translators, and they worked in six companies, each company taking a different part of the Bible. Two of these companies worked on the New Testament.

You may wonder why so many men were needed just to turn the Bible from one language into another, but you will know the reason when I tell you how the Translators went about their work.

They did not take one manuscript of the Bible and write it out in English. They gathered together all the versions of the Bible that they could lay hands upon. Some were in Greek, others in Latin, and many in English. Even the Bibles in Spanish, Italian, French, and German were used. They compared all these Bibles sentence by sentence, and word by word, until they got hold of what they thought were the right words. And it took these fifty-four wise men nearly three years before they got from the first word of *Genesis* to the last word of *Revelation*!

The Bible that the Translators used most of all was called the "Bishops' Bible," because it had been written by a number of bishops about the year 1568. They followed the Bishops' Bible as closely as the "original" would allow them. The "original" was the Greek version; but, as I have told you, the Translators did not have the oldest Greek manuscripts before them. They used a few that were not nearly so old. Whenever the Greek "original" did not help them, they used a Latin translation known as the Vulgate. This was much older than the Greek manuscripts used by the Translators, and there is quite an interesting story to tell about it.

THE STORY OF THE VULGATE.

Between three and four hundred years after Christ there were many Latin versions of the Bible, with many mistakes in them. St. Jerome set to work to make a new version, beginning with the New Testament first. When he had brought it out (in the year 385) many Christians were angry with him for changing the words of the older Bible they had got used to. (You will remember what I told you in the first chapter about how slow people are to take up anything new, even if it is better than the old.)

St. Jerome's version was more correct than the others, but it was *new*. So people abused him soundly for daring to alter a book that had become

sacred. St. Jerome, however, was a match for them. He hit back, with a fine show of temper. He called his enemies "two-legged donkeys," and wrote that "I could afford to despise them, if I stood upon my rights, for a lyre is played in vain to an ass." This was hardly polite, but it shows you that in those days even saints got angry and were rude.

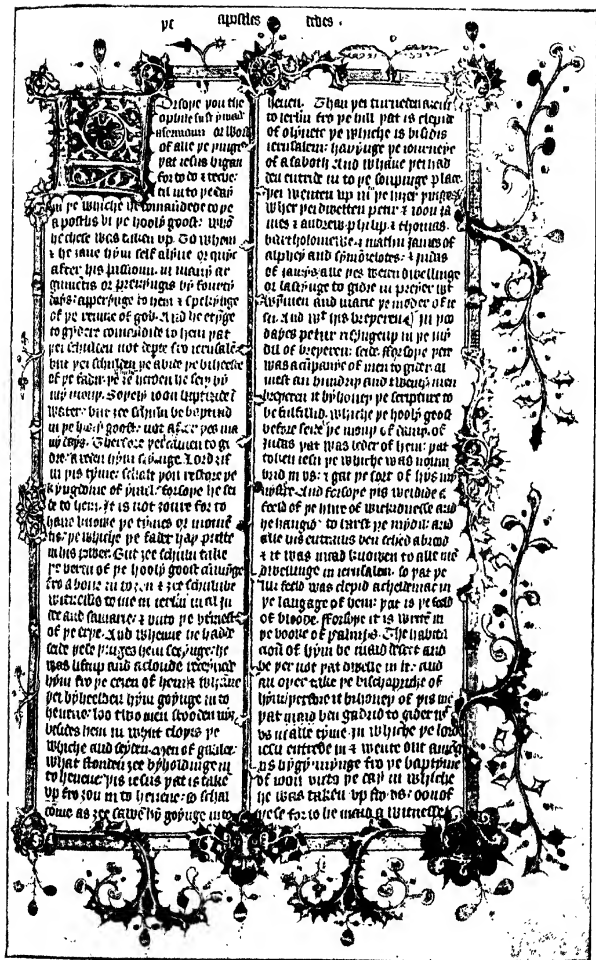
A thousand years later St. Jerome had the best kind of "revenge" upon the people who had abused him for making his own version of the Bible. His "Vulgate" was chosen by the Roman Catholic Church as the correct version, and it remains the "Authorized Version" for the Roman Church to this day.

St. Jerome had other triumphs. His version was the father of the English versions which the Translators, in the reign of King James, had before them when they went to work on our "Authorized Version."

HOW THE ENGLISH BIBLE CAME TO BE WRITTEN.

If you ever go to a Roman Catholic Church, you will find that the service is all in Latin. The same service, in the same words, is held at the same time in Roman Catholic Churches over the whole world.

The use of Latin in this way is a very old custom. Even in Anglo-Saxon times the priests spoke Latin in church. As very few people knew Latin in those days, it was useless to read parts of the Vulgate, or



A page from Wycliffe's Bible. This copy is now in the British Museum, and was written in the fourteenth century.

any other Latin version, in church. So some of the priests turned books of the Bible into the old English of the time. King Alfred himself translated parts of the Bible. But it was not until long after the Norman Invasion (1066) that the whole Bible was made into English.

This first English Bible is known as "Wycliffe's Version." Wycliffe was the parish priest of Lutterworth, and he was very anxious that the common people should have a Bible that they could read and understand. You might think that everybody in the Church would have been just as anxious; but the priests did not want the people to learn about religion from a book. They wanted to teach religion in their own way. And you can easily see that while the Bible was in Latin, and not in English, the people who did not know Latin could not learn about the Christian religion except through the priests.

So the Church treated Wycliffe as it had treated St. Jerome hundreds of years before. Wycliffe was tried and "excommunicated," which means that he was cast out of the Roman Church. One of the monks of his day described him as "the organ of the devil, the enemy of the Church, the idol of heretics, the image of hypocrites, the restorer of schism, the storehouse of lies, the sink of flattery." Forty years after his death the bones of Wycliffe were taken out of their grave, burned, and thrown into a river. People were forbidden by the Church to read Wycliffe's Bible, and anybody who was known to

have a copy of it was hunted down as if he were a criminal!

TYNDALE'S BIBLE.

You will not be surprised, I think, to know that a hundred years passed before anybody else tried to translate the Bible into English. The next man to do it was William Tyndale, and he did not have a much happier time over it than Wycliffe had. Printing had not long been invented, and Tyndale made up his mind to get his version printed secretly in Germany, and send it in large numbers to England before anybody could stop it. He got a printer in Cologne to "set up" his translation in type and print it.

As luck would have it, a priest learned the secret, and every English port was carefully watched. Copies of the book were hidden in barrels, in bales of cloth, in sacks of flour, and in all sorts of other ways. Many copies were seized and burned, but others arrived safely. A story is told that the Bishop of London wanted to buy all the Bibles that Tyndale had got printed, so that he might burn them. Tyndale agreed, and he used the money paid by the Bishop for the books to print better copies.

Finding that they could not stop the books coming into England, Tyndale's enemies tried to get hold of the man himself. Tyndale at first said he would never go to England, as he did not trust any promises of safety. "The King," he said, "would never be able to protect me from the bishops." But at last

the shyppe/with Zebede their father /mendinge there netts/ and called them. And they with out taryng leste the shyppe and there father and folowed hym.

¶ And Iesus wet about all galile/teachyng in there synagoges/ and preachyng the gospell of the kyngdom/ and healyng all manner of sycknes / and all maner diseases amonge the people. And hys fame spred a broade through out all suria. And they brought vnto hym all sicke people/ that were taken with dyuers diseases and grypyngs/ and them that were possessed with deuyls/ and those which were lunaticke/ and those that had the palsy: And he healed the. And there folowed hym a greate nombre of people/ from galile/ and from the ieruercees/ and from ierusalem / and from iury/ and from there: giens that lye beyond iordan.

The fyfth Chapter.

¶ When he saue the people / he

vi.



went vp into a mountaine/ and when he was sett/ hys disciples cam vnto him / and he opened his mouth/ and taught them sayinge: Blessed are the poure in spere: for theirs is the kyngdom of heven. Blessed are they that mourne: for they shalbe comforted. Blessed are the meke: for they shall inheret the erthe. Blessed are they which hunger and thirst for righte wesenoe: for they shalbe fylled. Blessed are the mercifull: for they shall obteyne mercy. Blessed are the pure in hert: for they shall se god. Blessed are the maynteyners of peace: for they shalbe called the chyldren of god. Blessed are they which suffre persecucion for righte wesenoe sake: for there is the kyngdom of heven. Blessed are ye when men shall reuyle you/ and persecute you/ and shal falsly saye all manner of evill sayngs agaynst you for my sake. Reioyce and be gladd/ for greate is youre rewarde in heven. For so persecuted they the prophetys which were before youre dayes.



* Erth.
The worlde this
kerke too possesse.
the erthe/ and to
defend there awd
ne/ when they vse
violence & power:
but christ teache
th that the worlde
muste be possessed
with mekenes on
ly/ and with oure
power and violen
ce.

All these dedes
here rehearsed as
to norishe peace/
to shewe mercy/
to suffre persecucion/
and so forth/ may
ke not a man haz
pyrre and blessed/
neither deserve to
be rewarde of he
ven: but declare
and testifie that
we archhappy and
blessede and that
we shall have gra
tiate. p. moci. i. he
ven. and certyfy
eth vs i oure herts
that we are
goddes sonnes/ &
that the holy god
ost is in vs. for all
good thynges are
given to vs frely
of god for chryste
bloudes sake and
his merites

a wicked man whom he trusted brought him to England and betrayed him. Tyndale was seized and put into a dungeon in the Castle of Vilvorde, in Belgium. He ended his life at the stake, where he was strangled and his body burned to ashes.

TYNDALE'S BIBLE AND OUR BIBLE.

Tyndale's Bible was the father of all the other Bibles from which our "Authorized Version" came. I need tell you only one thing about it. Tyndale did not use St. Jerome's version. He made his own version straight from the Hebrew (for the Old Testament), and the Greek (for the New Testament). However, the Hebrew and Greek manuscripts he used were not nearly so old as the ones that have since been found.

Tyndale was the last man to be killed for putting the Bible into English. If you will turn to your history books and read about the Protestant Reformation, you will know why he was the last. The Kings of England became Protestants, and no longer took their orders from the Pope at Rome. Tyndale was brought to the stake in 1536. Several other translations of the Bible were produced, and in 1539 one of them, called the "Great Bible," was authorized to be used in every church. •

About twenty years later another famous version of the Bible appeared on the scene. Some of the Protestant Reformers, who had fled for safety to Geneva, brought back an English version of the

Bible, which they dedicated to Queen Elizabeth. This they called the "Geneva Bible," and it is also known as the "Breeches Bible," because in the third chapter of *Genesis* it says that Adam and Eve "sewed fig-tree leaves together and made themselves breeches." This Bible, like the Great Bible, was copied a good deal from Tyndale's Bible.

THE "REVISED VERSION" OF THE BIBLE.

Now I want to jump from King James I to Queen Victoria—from 1611 to 1870. During all these years there had been no new version of the Bible. But, as I have already told you, manuscripts much older than those used for the Authorized Version had been found. So the Churches set about giving us a new version, which is known as the "Revised Version." Nearly a hundred men worked on the revision for over ten years. As they made use of the oldest manuscripts still left to us, the "Revised Version" takes us nearer than any other to the original manuscripts that seem lost for ever.

Remembering St. Jerome and his new Latin Bible, you will not be surprised to hear that many people were very angry at the "Revised Version." They did not like a single word in "The Book" changed, even though the word was wrong. The old version had become a *custom* with them, and many of them said they would never use any other version. They felt just as the people did in the

fourth century, when St. Jerome offered them something better than the old thing they had got used to.

But you and I need not, like St. Jerome, lose our temper at them and call them "two-legged donkeys." They were only doing what we are all apt to do when we meet something new and strange. We shy at it, as a horse shies at the first traction engine he sees. After a while the horse gets used to traction engines and takes no notice of them. So people are now getting used to the "Revised Version," and they will find it easier still to get used to it if they know a little about the many adventures of the Bible.

Here are some of the chief things I have told you about the Bible in this chapter:—

The word Bible means book.

Our Bible has been taken from older Bibles.

The Bible is a collection of books written by different people at different times.

We do not know who wrote any of the books of the Bible.

At first the books of the Bible were in "manuscript," written out by hand.

Those manuscripts were copied and copied many times by unknown people before they were printed.

The people who copied them made mistakes and added things on their own account.

The first manuscripts have been lost. The

oldest manuscripts which we still have are in different museums. Some are written in Hebrew, some in Greek, and some in Latin.

Many translations of the Bible were made into English before the "Authorized Version," which was made in the seventeenth century by fifty-four translators.

A few years ago another version called the "Revised Version" was made.

CHAPTER IX

WHERE DID RIGHT AND WRONG COME FROM ?

“WHY should we do right ?”

I do not think that Gerald, at the age of four, would ask this question or trouble about an answer. I was quite grown-up before I ever thought of asking it; and there are lots of people who get old and grey-headed without really thinking about such a question. And there are lots more people who, if I asked them “Why should we do right ?” would give the answer that a sister of mine was very fond of giving to difficult questions: “Just because!” Only, she said “*Just ticoz.*” She was no more than a tiny toddler when that was her pet phrase.

To say “Just because” is, of course, running away from the question. I would like you to ask some of your friends at school, and see what answers they give. Perhaps you would get a collection of “becausees” like this:—

Because my father and my mother tell me I must.

Because they would be angry if I did wrong.

Because we get punished if we are “found out.”

Because the Bible tells us so.

Because, if we are good, we will go to heaven when we die, and live happy ever after.

Because, if we are wicked, we will go to hell when we die, and be tortured for ever.

Because wicked people are taken by the police and put in gaol.

Because good people are always happy.

Because bad people are hated by good people.

Because we get treats when we are good, and are kept from treats when we are bad.

I could give you some more "becausees," but these will be enough to show you that the question is a bit of a puzzle. Perhaps you would like me to say, right away, which answer is right. If I did that, you would then ask me why that question was right, and I would have to begin all over again! But I can tell you one or two answers that are wrong.

The answer about hell is wrong.

Once upon a time people used to think it was right. When your grandpapa was a little boy, he was very likely told that if he was a bad boy he would go to hell and be burned for ever. You are luckier than your grandpapa, because people are wiser now, and do not try to frighten you into being good by talking about hell-fire.

The answer about the Bible is only half an answer. The Bible does tell us to be good, but the men who wrote the Bible were not the first to find out that we ought to do right. There were good people in the world who had never heard of the

Bible, so they could not have been good because the Bible told them so. They must have had some other reason.

What was it? . Why do we call some things "right" and others "wrong"?

Now, I am not going to pretend that I can give you a full answer in one chapter. "Right" and "wrong" deserve a whole big book to themselves. All I want to do is to let you see that "right" and "wrong" are really wonderful things, and that they have grown little by little and bit by bit, just as animals and plants, and suns and planets, and religions and the Bible have grown.

THE ADVENTURES OF RIGHT AND WRONG.

In the last chapter I told you how I used to think that the Bible had always been in the world, just the same as it is now, since the days of the Garden of Eden. So I used to think that "right" and "wrong" had always meant the same thing all over the world. When I grew up, I found that the Bible was a bundle of books that had changed a lot and had many adventures. Then I found that "right" and "wrong" meant customs and laws that also had changed a lot and had many adventures.

Does this seem strange to you? If it does, just think of the ancient Mexicans, who used to think it right to kill people in honour of the sun-god. Or think of the Spanish Inquisitors, who used to think it their duty to persecute and torture and burn

people who would not say that they believed in the Roman Catholic religion. Those things seem dreadful to us—too dreadful for words—but they seemed quite right to the people who did them.

Again, you will have read stories about the days of duelling. When a man was insulted he was bound *in honour* to fight the man who insulted him. Everybody would have despised him if he had refused to fight. Nowadays we would put a duellist in prison; and if one duellist killed another, we would very likely hang him as a murderer. Thus the old “right” has become the new “wrong.”

To this day savages have many customs that we think very wrong. In Africa certain tribes think it right to kill all twin children as soon as they are born. Many savage tribes think they ought to kill old people who have got frail and helpless. And you will remember the dreadful Indian custom of *suttee*, which the British Government had to use all its power to stop. There are hundreds of other customs that native tribes think “right” and we think “wrong.”

IS IT RIGHT TO TELL TALES?

I shall give you one more example—from boys and girls this time. You know how everybody at school detests anybody who “peaches”—or “clipes,” as we used to call it in Scotland. You know the old rhyme about the boy or girl who goes and tells the teacher about what some other boy or girl has done:—

Tell-tale tit,
Your tongue shall be slit,
And all the little puppy dogs
Shall have a little bit.

Well, in German schools—not so very long ago, at any rate—the boys were expected to tell the teacher when they saw other boys breaking the rules. The teachers liked the boys to act as spies on each other. So the sneak in a British school was the good boy in the German school! The German teachers thought it right that the boys should help to keep order by “telling tales” about other boys. But British teachers hate a “tell-tale” about as much as the British boys themselves do.

WHERE DID RIGHT AND WRONG COME FROM?

So you see that if you ask yourself “What is right?” or “What is wrong?” you have run your head against a hard puzzle. “Right” is different from what it was a hundred years or so ago, when we thought it right to fight duels and to hang people for stealing sheep. Time has changed the meaning of “right.” And what is right in Great Britain is wrong in Germany, or India, or the South Sea Islands. So the meaning of “right” is different in different parts of the world.

All the questions we have been asking about the earth, the animals on the earth, the religions of men, and the Bible, have been answered by finding out where these things “came from.” Can we do

the same for right and wrong? Can we watch the notions that men had about right and wrong growing as their notions about spirits and gods grew?

If we can, then we may begin to see why we feel we ought to do right. Once we understand how men came to say "This is right" or "That is wrong," we are on the road to answering the question, "Why should we do right?"

In the chapter on "Where did all the Religions Come From?" I began with the men of the Stone Age and with the living savages who are so like them in many ways. This time I want to begin further down the Tree of Life. I want to begin with the animals

RIGHT AND WRONG AMONG ANIMALS.

What, you may ask me, do animals know about right and wrong? Well, if you have ever kept a dog you will be able to answer the question yourself. You will know that it is easy to teach a dog that some things are right and others wrong. You can teach him to take bones into the garden instead of eating them on the carpet; and you can teach him not to bury them in holes scraped out in the middle of the lawn. You can teach him to come when he is called, and not to jump up on you with his muddy paws. You can teach him not to run after sheep and rabbits, but to hunt rats.

And if he is a good dog he will look ashamed of himself when he has done anything wrong. His

shame is not just fear of being whipped, because he will be none the less ashamed if you only scold him and tell him he is a bad dog.

No human being could be more faithful than a dog that loves his master. Many stories have been told of dogs that have been left to guard their master's property, and have then been forgotten. The dogs have stuck to their post hour after hour, in spite of hunger and thirst. They will fight to the death to save their masters; they will plunge into the sea to rescue people from drowning.

The dog, of course, is different from a wild animal, because he has lived with men and been trained by men. But the fact that he can be taught to do what is right and avoid what is wrong is surely wonderful. And even wild animals have their rules which must be obeyed. In Rudyard Kipling's *Jungle Book* you read about "the Law" which wolves and tigers and other animals have to follow.

This picture of a "Law" that animals talk about is, I know, a fanciful one. The *Jungle Book* stories are like fairy-tales about animals. But in a way they are very true. Every pack of wolves, every herd of deer, must obey the signals of its leaders. Any wolf or deer which does not obey is pretty sure to be caught by the enemy and killed. If it does not do what is "right" for the pack or the herd, it dies. That is its punishment. •

At the same time, the herd itself may be put in danger if one animal does not do its duty, and the animals that do obey have a much better chance of

living and of rearing young ones who, by following their parents, learn also to obey the law of the pack or the herd. So in time the "bad" or disobedient animals would be weeded out, and the "good" or obedient animals would be chosen, as I told you in Chapter IV.

For animals, then, "right" is whatever helps the pack or herd to survive, and "wrong" is whatever puts the pack or herd in danger.

Elephants, for example, live together in groups of families. Sentries are posted round the groups just as an army put soldiers on guard round a camp. If one of these elephant sentries goes to sleep at its post or wanders away for its own amusement, it would be doing something that an elephant—could it speak—would say was "wrong." The elephant sentries are posted to act for the benefit of others as well as of themselves. It is their *duty* to keep their eyes and ears open, to sound the trumpet-signal of danger, and if need be to fight to the death for the elephant group.

THE SECRET OF RIGHT AND WRONG.

Here we are right at the heart of the puzzle of right and wrong. When a lot of animals are living together they help each other in watching for enemies, in fighting, and in hunting for food. By helping each other they become like a well-drilled army. Each animal by itself may be weak and helpless, like a single horse faced by a tiger. But

when it stands shoulder to shoulder with a hundred other horses it is strong.

You will remember the old story of the father with the quarrelsome sons, and how he showed them that "union is strength" by first breaking a single stick, and then tying many sticks in a bundle that could not be broken.

Now, it is easy to see that when animals live together they must "give and take." They must, as we so often say, "play the game." They cannot have their own way in everything, because there are things that they must do for the group, and not just to please themselves.

Any animal that lives quite by itself can do just as it likes. It has no other animal to bother about. But the bee in the hive, the ant in the nest, the horse in the herd, the wolf in the pack, and the elephant in the group have all to do something for others as well as for themselves. And in doing something for others they do what is "right" in the animal world.

LEARNING FROM ANIMALS.

Remembering that we have come from animals, you will not be surprised to find that many things which are "right" in the animal world are right in our world too.

We say that it is right for fathers and mothers to look after their children well, to see that they get food, and to keep them from danger. Animal

fathers and mothers do the same. When there are young birds in a nest the father-bird and the mother-bird are busy every day fetching the fattest worms to fill the gaping beaks of their youngsters. When a cat comes near the nest the old birds are quite ready to attack it fiercely with their beaks. They are ready to give their lives for their young. And later on, when the young ones have grown feathers, the parents teach them to fly, so that they can look after themselves.

Lions, tigers, horses, deer, monkeys, and all the other "higher animals" show this loving care of children in a way that no one can mistake. If they did not look after their young, the race would die out. Baby animals are too feeble to defend themselves against strong enemies, and if their parents deserted them the babies would all be killed. So that when the old ones died also there would be none left at all! And the animals that took most care of their young would rear the biggest number, and so give the herd the best chance of thriving.

STRONG ANIMALS HELPING WEAK ANIMALS.

Again, we say that it is right for the strong to help the weak. There are some animals that do not worry about the sick and the feeble; they just leave them to die. But there are others that do show signs of pity.

One day when I was sitting on a hillside there was a flock of sheep grazing near me. Slowly they

came towards me, nibbling the grass as they came, and by-and-by I was surrounded by sheep. I was watching them, and listening to the soft ting-tong of the bells hung round their necks, when I heard one of them coughing. It was a very bad cough, and when the fit came on the poor animal would stand with its head down coughing, coughing, coughing. After each bout of coughing it would move on for a bit. Then I noticed that every time it stopped to cough another sheep would stop alongside it, looking at it with a mournful gaze as if it wanted to say: "Poor old chap, you have got it badly this time!"

The flock passed on over the hill-top, but still the invalid had its friend to keep it company.

In one of his books Charles Darwin mentions a very wonderful case of animal pity. A Captain Stansbury, who was travelling through Utah (America), saw a blind pelican which was fed, and well fed, by other pelicans upon fishes which had to be brought from a distance of thirty miles.

Here are some other cases that will show you how even "vermin" (as some animals are called) can be good Samaritans:—

A wounded badger was carried away by another badger.

Rats have been seen feeding a couple of blind rats.

Two crows were seen in a hollow tree feeding a third crow, which had been wounded.

A weasel picked up and carried away an injured comrade.

The weasel and the badger faced danger to help their friends, but if you know anything about weasels and badgers you will be less surprised at their courage than at the way they showed pity. If a weasel or a badger can be tender to the wounded, it is not wonderful that our soldiers will risk their lives for a helpless comrade.

Here is another case to show you that animals sometimes behave very like soldiers in an army. If you have read about the battles in the Great War, you must have seen the words "covering the retreat." They mean that when an army is going back, and is being pursued by the enemy, it keeps some companies of the bravest and best soldiers to hold the enemy at bay so as to let the rest of the army, with the guns and ammunition and food, get away to a place of safety. These brave men form the rearguard to "cover the retreat."

Now, a traveller in Peru (South America) noticed that, when herds of vicunas were being hotly pursued by hunters, the strong male vicunas used to form a rearguard in just the same way. They covered the retreat of the weaker ones. The vicuna is a camel-like animal that grows a long red wool. It is smaller than the camel, and not a fierce animal like the lion or the leopard. Yet in times of danger it shows itself a hero, ready to give its life for the herd as the soldier, gives his life for his country.

WHY ANIMALS DO RIGHT.

If these examples do not make you feel quite sure that wild animals are kind to their young, self-sacrificing, and able to feel pity, you can look for others in books of travel. What I would like you to remember most of all is that, if animals had not shown kindness and heroism, they would not have been able to survive. If they had not been able to work together faithfully, and to help each other in times of danger, they would have been killed off by their enemies.

In the animal world, then, there is a reason for "right" and "wrong." And when we turn from animals to men we find that there is still a reason for "right" and "wrong."

When I was a little boy at school the teacher once wrote on the blackboard:—

MAN IS A GREGARIOUS ANIMAL.

I remember this sentence, because I was very proud of being able to say such a big word as "gregarious." I was still more proud of knowing what the word meant.

The dictionary says that "gregarious" means "living in flocks or herds," or "not living alone." Men like to live together in villages or towns, just as wild animals like to live in flocks and herds. And just as the wild animals have to obey "the

Law" in doing things for the flock or herd instead of pleasing themselves, so men living together have to serve and help others instead of doing anything they choose. They, too, have to be kind to their children; they, too, have to assist the weak; they, too, have to be ready to give their lives to save others. It is "right" to work for and protect others; it is "wrong" to go one's own way and refuse to play one's part in the clan or the nation.

So "right" and "wrong" grow up because men live together. When Robinson Crusoe was alone in his island he did not need to worry much about right and wrong. He could be as selfish as he liked, for he had no one else to think about. He did not need to be careful about telling the truth, for there was nobody to deceive. He could not cheat, or rob, or bully, or murder, for there was no one to cheat, or rob, or bully, or murder. He could not even be rude or quarrelsome! If ever there was a man in the world who was free to do as he liked, it was Robinson Crusoe.

Perhaps you think he found it very jolly to have no rules to obey, nobody to tell him that he ought to get up early in the morning, that he ought to work hard, that he ought to be honest and kind, and all that. If you do, I would like you to look at the part of *Robinson Crusoe* which tells you about Friday. Then you will see that you are quite wrong.

As soon as Friday came on the scene, Robinson gave up pleasing himself and began to do things to

help the poor savage. He gave Friday food and clothes; he built a tent for him; he taught him to speak the English language; he looked after him just as a father would look after a child. And he was careful always to tell Friday the truth, and to be kind to him, so that Friday would trust him and serve him faithfully.

In doing his duty to Friday he also taught Friday to do *his* duty. He showed Friday how to cook meat, how to beat corn and to make bread, and how to till the soil to grow more corn. He taught him to be faithful and truthful and obedient. In training Friday to do what was "right" he had a chance of doing "right" himself—a chance which he did not have when he lived alone.

Robinson Crusoe, you see, took a lot of trouble to teach Friday. Although Friday was a cheery soul, he was very ignorant when he came to the island, and Robinson spent a long time in training him. But you will find that Robinson said: "This was the pleasantest year of all the life I led in this place." Again he said: "My life began to be so easy that I began to say to myself, that could I but have been safe from more savages, I cared not if I was never to remove from the place while I lived."

I do not suppose that Robinson ever asked himself the question: "Why should I do right to this savage who is at my mercy?" But you can see that if he had not done right by Friday, if he had not "played the game," Friday and he would not have been

able to live together happily and to help each other properly in time of danger.

RIGHT AND WRONG IN THE STONE AGE.

Now we are ready to take up the story of "right" and "wrong" from the time of our great-grandfathers of the Stone Age.

We may be quite sure that these great-grandfathers of ours did not live alone as Robinson Crusoe had to do.

Among the apes, who were their nearest animal cousins, several families keep each other company. Savages, who are very like what men of the Stone Age must have been, also live in groups of families called "tribes." And you will agree that a group of men and women could not hold together, any more than a group of animals could hold together, unless they helped each other and did what was "right" or "good" for the group.

Let us suppose that some men and women of the Stone Age did not look after their children in the way we call "right." There was no Society for the Prevention of Cruelty to Children in the Stone Age; there were no Dr. Barnardo's Homes for deserted children; there were not even workhouses where poor children could be fed and clothed, and taught to earn their living. Any little Stone Age children left without the care of their parents would die of starvation, or be gobbled up by some beast of prey.

So the "bad" people who were not kind to their children would leave no sons and daughters like themselves when they died. On the other hand, the parents who protected their children, and taught them how to avoid danger, how to find food, to build shelter, and to fight for themselves, would give these children a good chance of going on living till they were quite grown-up and had children of their own to look after in the same way. The children of the "good" people would live, and the children of the "bad" people would die.

In the same way, any boy who was lazy or disobedient or careless would have a very rough time of it. If he did not learn how to track game, how to use his stone axe, and how to find out when danger was near, he would stand a very poor chance when he grew up and had to look after himself. If he told lies, he would have nobody to trust him and come to his aid in time of danger. If he stole things, the people whom he stole from would try to kill him. There were no prisons in the Stone Age! The punishment for nearly every wrong thing was death.

RIGHT AND WRONG IN WAR.

It was not only in the family that the children of the Stone Age were taught the difference between right and wrong. Families lived together in groups so as to be able to help each other better in finding food and in fighting their enemies. Just as each

family had to obey its father or grandfather, so each group had a strong, clever man as its chief. It was the chief who made "the Law" for the group, and who punished those who were wicked and broke the law.

If you want a picture of the life led by our savage great-grandfathers, you need only look at the savages of to-day. Africa has a host of native tribes, each living in its own part of the country, each with its own chief and its own customs. Nearly all these tribes are very fond of fighting. When the British conquered the country inhabited by these natives, the first thing was to stop the tribes trying to kill each other. In olden days there was no British King to be chief over all the savage chiefs. There was no British army to force the tribes to keep the peace.

So we may be sure that the earliest tribes among our savage great-grandfathers were often at war with each other. Like the Red Indians, they would often invade each other's country and carry off as much booty as they could get. Even if some of these old tribes were not so fond of fighting that they went off on the warpath, they would have to fight to defend themselves against other tribes. Red Indian stories are not so common now as they were when I was a boy; but I expect you have read some of them, and know that nearly every Red Indian boy was trained to be a warrior as well as a hunter.

Now I want to ask you a question: "Why is it that one tribe is able to beat another tribe?"

You may answer that it is because it has better fighters than the other tribe—men who can use the bow and arrow better, or swing an axe better. That is all right as far as it goes, but it is not everything. You will be surprised to find how many things go to help one tribe to conquer another. Here are some of them; and I have put alongside each of them the word that shows you what it has to do with the things we call “right” and “wrong” :—

The men who follow their leader will have a better chance of winning than those who do not do what they are told.

OBEDIENCE.

The tribe in which all the men keep their oath of allegiance to the chief will win against a tribe that has traitors in the ranks.

LOYALTY.

Brave men will conquer cowards.

COURAGE.

The men who can go on fighting longest, who “refuse to be beaten,” will often gain a victory against heavy odds.

ENDURANCE.

The men who “work together” best will have a better chance than those who are envious or jealous of each other.

NO ENVY OR
JEALOUSY.

The men who can trust each other and their chief will fight better than those who are in the habit of telling lies and cheating.

HONESTY.

Men who are treated well by their chief will, if they are brave, follow him to the death. A chief who is cruel to his men will be deserted by them when danger is near.

KINDNESS.

Warriors who work hard at learning to fight will beat lazy and careless warriors.

DILIGENCE.

There you have eight reasons why a tribe should do "right." If the men in the tribe are obedient, loyal, brave, enduring, free from envy or jealousy, honest, kind, and diligent, they will conquer a tribe where the men are not so obedient, so loyal, so brave, so enduring, so free from envy or jealousy, so honest, so kind, and so diligent! This means that the men who do "right" in these ways will have a better chance of living than those who do not.

The men who do right will win battles, while those who do wrong will be killed off. So the good men are "selected," just as Nature "selects" animals that look after their young and obey the law of the herd or pack.

WHY CRUELTY IS WRONG.

People used to think that the fiercest animals had the best chance of being "selected" because they were able to kill any other animal. But if these people were right there would be far more lions and tigers in the world than timid animals

like the deer family. Among animals the biggest tribes have been those which, like deer and horses and cattle, are able to work together in defending themselves. The lion goes out by himself to hunt and to kill; horses and deer and cattle move in armies of hundreds and thousands.

If fierceness were everything, the sea would be full of sharks. But there are far more herring and mackerel and codfish in the sea than sharks.

We find the same thing among the tribes of men. It is not the fiercest and cruellest tribes that get on best. They may conquer other tribes for a while, but after a bit their very fierceness and cruelty make other tribes join forces against them and crush them.

The Germans are very fierce and cruel in war, and at first they were able to beat Denmark, and then Austria, and then France. These victories made the Germans strong; and they began to make themselves stronger, so as to conquer other nations. But what happened? Every other nation saw the danger, and began to get ready for it. Great Britain made friends with France and with Russia, who had once been the enemies of Great Britain; and when, at last, Germany made war, she found Great Britain, France, Russia, Italy, Belgium, Serbia, and Montenegro all against her. These nations combined to crush Germany because Germany was so strong and so fierce and so cruel.

You see, then, that a fierce and cruel nation makes enemies. And the more fierce and cruel it

is, the more its enemies join hands against it. It is just like a bully at school. He makes all the other boys fear him and dislike him ; and by-and-by the other boys league against him and "send him to Coventry." On the other hand, a boy who is kind as well as strong, who "plays fair" and is what you call "a decent chap," makes plenty of friends.

RIGHT AND WRONG IN PEACE.

Even in war, then, which is the fiercest and cruellest thing in the world, a tribe or nation which does what is "right" will have a better chance of winning in the end than one that does "wrong."

When I used to read history books at school I got the idea that people in the olden times were always fighting. I had to learn about war after war, about invasion after invasion. There was very little else in the history books, except stories and dates about kings and queens.

But even in the olden times everybody could not have been always fighting. The armies of those days were very small, and most of the people spent their time at something else than trying to kill each other. Some ploughed the land and sowed it with corn ; others ground the corn. Some tended sheep and cows ; others made cloth from the wool of the sheep and leather from the skins of the cows. There were fishermen, and innkeepers, and blacksmiths, and house-builders, and carpenters, and so

on. All these men made or did something for which they were paid. Instead of fighting each other, they *traded* with each other.

The first kind of trade was like what you do among your school-fellows when you "swop" or exchange a penknife you don't want for a cricket ball you want very much. "Barter" is the name given to this kind of bargain. I could give you a lot of examples, such as the Red Indians bartering furs for guns and powder, or African natives giving ivory in exchange for beads and bright-coloured cloth, of which they are very fond. But all I want to do is to give you a hint that in peace as well as in war the people who do "right" are able to get along better than those who do "wrong."

If the schoolfellow who did the exchange with you told you that the cricket-ball was a very good one, and you found out that it was a bad one, you would call him a cheat. In time all your school-fellows would get to know that he did not "play fair." So they would have nothing to do with him. He would be an "outsider."

The same happens to a man who cheats in trade. He may be very clever, and get the better at first of people who trust him. But by-and-by the other traders get to know that he is a cheat, and will not trade with him.

Again, suppose a hunter gets a gun on the promise that he will bring so many skins of animals in exchange, and he does not keep his word. No matter how much he may need anything afterwards,

he will not get it, because people know that he is no better than a thief.

On the other hand, a man who is honest, who makes a fair bargain and always keeps his word, will find everybody ready to trade with him and help him. And a tribe or nation that is lucky enough to have honest traders will do more trade than a tribe or nation where most of the traders are cheats. Doing right will help a nation to be happy and honoured and prosperous; doing wrong will make it despised and poor. Once more, then, the nation that does right will be "selected" rather than the nation that does wrong.

WHAT IS RIGHT?

I hope I have told you enough to make you feel that there is a real reason for "right" and "wrong." If you were to ask me, "What is Right?" I would answer that "Right is what is best for people living and working together." In other words, Right is the Law of the human race. The Law has grown up slowly from savage times. It has changed in some ways, because people have become kinder and juster and better than in the old days. So the Law has become better, and it will become better still as we get wiser and more "civilized."

I hope, also, that I have made you understand why your father and mother and teachers are all so anxious to make you do "right." When you do wrong, and so "break the Law," they correct you

and punish you, so that you will do right next time. They do this to help you to get into the habit of doing right. They know that if they let you go on doing wrong you will grow up to be unhappy and despised by the people you live among.

When you grow up and have children of your own, you will teach them to do right in just the same way. And you will find it hard to explain to them, when they are very young, and do not know much about anything, just why they should do this and should not do that. So you will tell them that they must obey you, or they will be punished for it.

Now, savages are little children in many ways. They are like children with the bodies of men and women. How, then, are savages made to do right if they are all like children? Who is it punishes them if they break the Law?

In the chapter about "Where Did all the Religions Come From?" I told you that savages were very ignorant; but I also told you that they were *afraid*. They are afraid, most of all, of the spirits that haunt every house and tree and river. So a chief who wanted to frighten his tribe into obeying him had only to tell them that the spirits would be angry if they did not do as they were told. That threat was worse to a savage than the chance of having his head chopped off.

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THE CUSTOM OF RIGHT AND WRONG.

You will remember, too, the savages in South

America (*see* Chapter I), who have no word for right or wrong. *Pia*, meaning "custom," is their Law. They follow the custom of their tribe much as a wild horse follows the custom of the herd. You and I know that if a tribe has managed to thrive, most of its customs must be "right" or "good." But the ignorant savage does not know that. He just does what he sees the people round him doing. And if you think that a sheepish thing to do, you ought to ask yourself if you do not do the same thing yourself! We all wear very much the same kind of clothes, because it is the custom for English boys to wear coats and hats and trousers and boots, and so on. If you went to school dressed like a Red Indian, you would set everybody laughing, and would have to run home again and change. Even if you did nothing more out-of-the-way than to wear your gymnasium clothes at a Christmas party, people would make an awful fuss. Why? Just because you have done something that is not "the custom."

"Custom" and fear, then, are the two things that make a savage do certain things and keep from doing others. When savages came to believe in powerful tribal gods, in the way I told you about, they were afraid of the anger of these gods. Each tribal god was looked upon as a big father who was ready to punish his children if they did not obey the customs of the family or tribe. So, little by little, men came to believe that the Law they obeyed was given to the tribe by the tribal god. They thought that it had not grown up by itself, but had come from above.

The "Ten Commandments" give us a good example of laws that were supposed to come from the tribal god. You read in *Exodus* (chapter xxiv) that Moses was told by Jehovah to go up to him on Mount Sinai, "and I will give thee the tables of stone, and the law and the commandment, which I have written, that thou mayest teach them." Further on you read that "Moses assembled all the congregation of the children of Israel, and said unto them, These are the words which the Lord hath commanded, that ye should do them."

It is easy to see that the Israelites would be much more likely to obey the Commandments if they thought God had written them down than if they knew that they had been made by men. If you were a tribal chief, you would find it very handy to say to your people: "This is what our tribal god says you must do, and if you do not do it he will punish you by sending sickness and defeat and all sorts of bad luck." That would make them "sit up" and behave themselves.

I do not want you to think that the leaders used to cheat the people by telling them about what the tribal god was supposed to have ordered. The chief of a tribe was supposed to know what the tribal god wanted. Indeed, the tribal god was supposed to tell the chief, in dreams, in the roll of thunder, and in strange things like eclipses of the sun, what should be done, and what things were "right" and "wrong."

And in your history books you read about the

"Divine Right of Kings," that ever so many nations believed in until not many years ago. The king was looked upon as being put on the throne by God, and as ruling in the name of God. Whatever the king said was supposed to be in the name of God. Anybody who refused to do what the king ordered was told that he was disobeying God.

RIGHT IS RIGHT.

Now that people are wiser and know that right is right, because it is the law of true happiness for people living together, they do not need to be threatened with dreadful punishment in the next world if they do not obey the Law of Right in this world. They see that doing wrong has bad results; they know that people who do right are happier than those who are cruel or deceitful, or selfish or bad-tempered, or lazy or envious. So they try to get out of bad habits, and to train themselves to be kind, truthful, unselfish, good-tempered, hard-working, and free from envy.

All the same, the best people do not do right just because they hope to be happier. That would be like doing good for a reward. It would be like the dog who is content to sit "on trust" with a biscuit on his nose until his master says "Paid for!" because he knows that he will not get the biscuit unless he obeys. The soldier who wins the Victoria Cross by carrying a wounded comrade across the fire zone to safety does not act the hero just to get

the Cross; he does it because he is kind and courageous. He would do just the same if there was no chance of anybody seeing the brave deed.

One of the sentences I used to write in my copy-book at school was: "Honesty is the best policy." This sentence is quite true. Honesty *is* the best policy. But you would not think much of anybody who was honest *just because it was the best policy*. You would think more of a man who was honest without thought of reward.

That is the meaning of the phrase, "Virtue is its own reward."

TO REMIND YOU.

This has been a long and perhaps a difficult chapter, so I shall go over some of the chief things I have told you in it:—

Many people do not really know why they should do what is right.

People's ideas of right and wrong are not always and everywhere the same.

They have grown up little by little.

We find the beginnings of right and wrong among animals.

Animal groups have to obey the Law of the group, or they will die. The Law is "right" for the group.

Animals show pity and loyalty, and courage and self-sacrifice, and many other "virtues."

Men of the Stone Age lived in groups, just

as animals do. They had to "do right" in order to live and thrive.

Even in war men have to do what is right to conquer other men. In peace also it is right for them to be obedient, loyal, brave, enduring, free from envy or jealousy, honest, kind, and diligent.

Savages do right because of the fear of being punished by their chief or their gods.

The best people do right just for right's own sake.

CHAPTER X

HOW DO THINGS HAPPEN?

WHEN a boy is given a toy like an engine, what is his first wish? If he is anything like the boys I know, he will want to take it to pieces to see how it works.

Grown-up people sometimes think that boys take things to pieces just for the "love of destruction." It is, of course, pleasant in a naughty kind of way to smash things. Babies like to pull dolls to bits and squeeze all the sawdust out of them. And I used to enjoy putting a bottle on a rock upon the seashore and pitching stones until one sent the bottle crashing into smithereens.

All the same, the boy who takes an engine, or a clock, or a model aeroplane to pieces so as to see "how the wheels go round" is doing just what wise grown-ups do when they want to find out the wonders of plants, animals, and the other things that are called "science" in your school.

WHAT SCIENCE MEANS.

The botanist takes flowers and branches to pieces to see how the plant "works," how the sap rises to feed the plant, how the leaves "breathe," and how

the seeds are formed that fall to the ground to make new plants. He learns a lot by cutting very, very thin slices of different parts of a plant, and looking at these slices through a microscope.

The zoologist takes dead animals and cuts them up to see how (when alive) they breathe, and how they take in their food and "digest" it, and all the rest of it.

The chemist (I mean the chemist with his test-tubes and his "stinks," not the chemist who sells pills in a shop!) takes all sorts of things—clay, wood, oil, sea-water, and anything else you like—and he heats them, or pours acid on them, or does something to break them up into the simpler things out of which they are made. Perhaps you have done some of this yourself in the school laboratory, and know that it is called "analysis." To "analyse" means to "separate again," which is just what a boy does with his toy engine.

Doctors and other wise people do the same sort of thing in trying to find out how our insides work, how electricity works, how rocks are made, and so on. "Science" is just finding out how things happen.

Now, you will remember I told you that savages are very ignorant. They cannot read or write; they have no microscopes, or telescopes, or chemical laboratories, or electrical machines. They know how to hunt and fish, how to build rude huts, how to make weapons, and how to do other simple things.

But they know very little about how the world around them "works." They do not know why the sun rises and sets, why the moon changes shape, why the wind blows, why the rain falls, why they fall sick, why the earth sometimes trembles under them, why the tide rises and falls. They see all these things happening, and if they think about them at all they are very puzzled.

If they think about them at all. I know lots of people who do not think much about how the world works. They do not even worry about what goes on inside them when they swallow food. They do not trouble about how plants live, or how mountains were made, or how bees make honeycomb, or how earthworms help the farmer.

They live in a world of wonders, but keep their eyes shut and their ears closed to most of the wonders. It is only when something out-of-the-way happens, like an eclipse of the sun, or a great storm, or a bad illness, that they begin to ask questions about things that were under their noses all the time.

THE SAVAGE'S ANSWER TO THE QUESTION.

When the savage began to ask questions he gave one and the same answer to all the things he did not know about. His world was full of spirits, and he blamed or praised the spirits for everything. If the rain did not come to water the crops, then the rain-god must be annoyed. If the floods came and

swept away his hut and his cattle, then the river-god was cross. An eclipse of the sun meant that the sun-god was angry and was hiding his' face. When people fell sick and died, they were being punished by some spirits whom they had offended.

This, you see, was a very easy way of explaining everything. Whatever happened, some spirit had a finger in the pie. Just think how nice it would be for you in school if you could give the same sort of answer! When the teacher asks you about the cause of volcanoes, it would be very jolly if you could answer, like the natives of Australia, that there were demons under the earth who made great fires and threw up red-hot stones.

Or, again, if you were asked why water left in an open bowl "dries up," you would like to be able to say, like a native of Peru, that the sun-god drinks it.

I could give you hundreds of other "easy answers to hard questions." But I shall give you just one or two that will show you what queer notions savages got into their heads when they tried to find out how things happen.

Nothing is more likely to frighten a savage than thunder and lightning. Even some of us wise people are very much afraid while a thunderstorm is on. Among the Indian tribes of North America it used to be thought that a great spirit-bird clapped his wings to make the thunder. The lightning was the flashing of the spirit-bird's eyes. Some marks on the ground, five-and-twenty miles away from each

other, were pointed out as the footprints of this thunder-bird.

HOW SCIENCE GETS TO KNOW THE ANSWER.

We know now that thunder and lightning are just a big electric spark. Benjamin Franklin found this out by flying a kite during a thunderstorm, and getting a spark from the end of the wire that held the kite. The electricity in the cloud flowed down the wire and made sparks there instead of big flashes between the cloud and the earth.

If Benjamin Franklin had believed in the thunder-bird story, he would not have bothered to find out whether a lightning flash was a big electric spark. He did not believe the thunder-bird story. He thought that the spark he got by putting his knuckle near an electric machine was a tiny imitation of the big flash-bang of a thunderstorm. So he tried to find out if there was any electricity in a thunder-cloud, and he found that there was.

Here is another story of the same sort. In Kamtschatka natives believe in a spirit, called Billukai, that lives in the clouds and sends thunder and lightning and rain. When a rainbow appears, they think they see the hem of Billukai's clothes! Other people have thought that the rainbow is the road to heaven, and that if you could only get to the end of the bow you could climb right up to Paradise.

Your school books tell you a different story. They

remind you that if you look through a piece of glass shaped like this Δ you will see "all the colours of the rainbow." This is because the glass splits the sunlight up into all the coloured lights out of which it is made. And when the sunlight strikes on a cloud that is pouring rain on the earth, all the tiny drops of water split up the light in the same way into all the colours of the rainbow.

These two stories will let you see the difference between the old way and the new way of answering the question, "How do things happen?" A savage puts everything down to a spirit or ghost that nobody ever saw, or really knows anything about. We try and find out how things *work*.

All the same, you must not think that it is only savages who have all these funny old ideas about how things happen. The Russian peasants are not savages. They are Christian people, but they still think that spirits have a lot to do with what goes on in the world.

For example, they watch for a day in spring when the sun and the moon are in the sky together. If the day is fine, they say that the sun and the moon are friendly, and that the weather will be good. If the day is dull, they think that the sun and moon are sulky with each other, and that bad weather will follow. Should the day be stormy, they are very much upset, because it means that the sun and the moon have quarrelled, and that there will be earthquakes.

I expect that you will laugh at such an absurd

notion. Fancy the sun and the moon quarrelling, and their quarrel causing an earthquake! It is just like a fairy-tale. But the savages and the simple peasants are very serious about it all. They do not know what brings about good weather or bad weather, and they do not know how earthquakes happen. And because they think that there are spirits everywhere, and that the sun and the moon are spirits, they are quite sure that the good temper and the bad temper of the sun and moon have a lot to do with bringing good weather or bad weather.

HOW SICKNESS HAPPENS.

But we must not look down upon the savages and the simple peasants too much. It is not so *very* long ago since people in our own country thought that some things happened in the same sort of way.

During the Great Plague in London (1665) many good folk thought that the terrible sickness was a punishment sent for the sins of the people. The real cause of the Plague was that the houses people lived in were dirty and infested with rats. The British live cleaner lives nowadays, and the Plague is hardly ever heard of, except in countries where people are still as dirty as they used to be in London three hundred years ago.

Now and again a man in Great Britain is found to have the Plague, but it is usually through some one who has just come from a foreign town. We do not say nowadays that such a man got a terrible

disease because he was wicked. We just say that he "caught the infection." As a matter of fact, the infection of the Plague is carried by a special kind of rat-flea. When this flea bites a rat suffering from the Plague and then bites a man, it carries the infection from the rat to the man.

In the Bible you read about people being "possessed of a devil." This meant that they had fits or were mad. One man who was very ill had seven devils in him, and the story is told how Jesus chased all the devils out of him and sent them into pigs. Then the pigs went mad, and ran down the hill into the sea and were drowned.

The Jews thought that fits and madness were brought about by a demon getting into a man and tormenting him. Nowadays we know that when a man falls in a fit or behaves strangely there is something wrong with his brain. We do not worry about demons. We send him to the doctor to get medicine and special food and special care, so as to help him to get better. Sometimes it is possible to cure the trouble by opening up his skull and taking away a piece of bone that is pressing on the brain and keeping it from working in the right way.

* All over the world you will find tribes that believe sickness to be caused by spirits getting into the patient's body. In Patagonia every sick person is said to be "possessed of a devil." And the Patagonian doctors do not bring medicine.

They come along with a drum painted with the figures of devils, and they stand at the bedside banging the drum to drive away the spirit that is troubling the patient.

I should think that if the patient were not very ill this would be enough to make him get up and run away as if he had been cured. If he were very ill, it would be enough to kill him!

You need not wonder that savages had this idea about spirits and sickness. They did not know anything about their insides. They did not know anything about nerves—those tiny telegraph wires that run from every part of the body to the brain and carry the messages of pain when we are hurt or ill. When savages had a pain they felt as if something inside them was biting or stabbing them. Thinking that spirits were everywhere, they said that the something troubling them must be a spirit.

Next time you have toothache you will be able to see that the savage put "two and two together" very well. The pain is just like something gnawing at your jaw. Perhaps you will be sorry that it is not caused by a demon that you can frighten away, because toothache usually means that you will have to go to the dentist and have a hole in the aching tooth "stopped" so as to cover up the nerve. The dentist does not believe in demons. He scrapes and drills and cleans the hole; then he fills it up with cement, and tells you that if you do not brush your teeth more carefully you will have more holes and more toothache. That is how toothache happens!

THE SAVAGE'S BLIND MAN'S BUFF. .

You will remember I told you how savages live in a "funk" most of the day and all the night—when they are not sound asleep. They are frightened because they think spirits are the cause of everything, and *because they never know what the spirits are going to do next.*

It must be very worrying to imagine that every tree, every stream, every hill, every cave, is haunted by a ghost, and that, if you forget some little thing that one of these ghosts thinks you ought to do to please him, he will get angry and punish you with a bad cold or a boil on your neck.

Savages are always making little presents to these ghosts or spirits to keep them in a good temper. For example, some of them pour a little water and scatter a little food on the ground before they begin a meal. That is *their* way of saying grace. They share their food and drink with the spirit which is supposed to send the food and drink. When spirits are evil—and most of them *are* evil—savages wear "lucky stones" or some other "charm" against these spirits.

All the same, savages never know whether the presents and the charms will really work. They are playing a kind of Blind Man's Buff with the spirits, where all the men are blindfolded and the spirits see everything and make the rules of the game anything they please. Or they are like

children in a crazy school where the teachers are invisible, but make new rules every day and punish everybody who does not obey rules they never learned !

So the world, as the savages see it, is always in a muddle, always at sixes and sevens. Even when they do not blame a spirit for anything that happens, they put it down to something that has nothing at all to do with it.

A little while ago I read about an African native who was wounded in battle, and put all his trouble down to his wife, who must have been behaving badly while he was away at the war. Even if this warrior hit his toe against a stone he would blame his absent wife.

The real reason why he was wounded was that he did not defend himself cleverly enough. And the real reason why he hit his toe on the stone was that he did not watch where he was going. All the same, I expect that he gave his wife a good beating when he got home !

People like savages, who believe in spirits that interfere all over the place, never really know how things happen. And before we can begin to find out how things do happen, we must get it into our heads that *everything in the world follows rules that never change.*

THE REAL LAWS NEVER CHANGE.

Is this too big a mouthful to swallow all at once ?

That depends upon how much you have learned at school. But to make it easy for everybody, I will let you have a small mouthful to begin with.

When I was telling you about the Babylonian boy and his ideas of how the world was made, I spoke about how wonderfully bright the stars shine in that part of the world. Our skies are so often cloudy and our air so hazy that only now and again do we get a really clear starry night. But in the East the stars burn and blaze like living fires night after night.

Little wonder, then, that the Persians and the Greeks and other people in that part of the world were great star-gazers. They used to think a lot about the stars. Most of the stars, they noticed, were "fixed," but others moved in a regular way, as if they were being steered across the sky like a ship. These were the planets: the word planet means "wandering star." And at one time people thought that each of these planets was guided by an angel, who rode on it as a huntsman rides his horse.

You will not find anything about angels in your astronomy books. You will read there that Kepler, a Danish astronomer, who was born in 1571 and died in 1630, found out three laws that the planets followed in their movement round the sun. I need not tell you what these laws are, because you will learn them in school when you are old enough to understand them. What I want to get at is the discovery which Sir Isaac Newton made about these laws.

HOW NEWTON FOUND OUT A LAW.

The story goes that Newton was sitting in his garden under an apple tree, thinking about the sun and planets, when an apple fell into his lap. Then the truth flashed across his mind that the force which drew the apple to the earth was the same force that held the planets in their courses round the sun. It also guided the moon in its track round the earth. It also guided the moon-children of the planets round the mother-planets. It also guided the comets on their long journeys towards the sun, and back again into space.

In a word, this force was everywhere, and it was always the same.

Not very long ago astronomers found out what they call "double stars." These are pairs of stars that circle round each other. And here, again, millions and millions of miles away from the sun and planets, the same force is at work. The falling stone, the earth, the sun, the stars—everything everywhere follows the same law—the "law of gravitation," as it is called.

I do not know anything more wonderful than this. It is much more wonderful than spirits and angels. And it is much more *useful*. So long as we think that spirits and angels are making things happen, we can never know what is going to happen. No one can tell what a spirit or angel is going to do! But we are quite able to tell beforehand what is

going to happen to the planets. If you ask an astronomer where the planet Jupiter will be found at twelve o'clock on Christmas night twenty years hence, he will tell you. More than that; he will be able to set a telescope so that if it is not moved until Christmas night twenty years hence you may look through it at twelve o'clock on that night and see the planet Jupiter.

In the same way, he can tell you when a comet which has been long lost to view will come in sight again. He can tell you the exact time and place. He is as sure about it as you are that a penny you spin in the air will fall back to earth again.

HOW NEPTUNE WAS FOUND.

The story of the planet Neptune is even more remarkable. Astronomers found out about Neptune long before they saw it. In the year 1781 Sir William Herschel found the planet Uranus with the help of his telescope. After the movements of this planet had been watched for some time, it was seen that they were not exactly what they ought to be, if only the sun and the other known planets were acting on it under the law of gravitation.

The astronomers did not wonder if the law was not working quite rightly in the case of Uranus. What they suspected was that some unknown planet was pulling Uranus a little out of the track it would otherwise follow. So they set out on a kind of detective hunt — not with the help of Sherlock

Holmes, but with the help of arithmetic. They watched just when and where, and by how much, Uranus went off the track; and by using the law of gravitation they worked out a lot of sums that gave them a certain answer. The answer was that an unknown planet would be seen in such-and-such a part of the sky at such-and-such a time.

When the telescopes were turned to this part of the sky, they found the planet Neptune almost exactly at the very spot that had been foretold.

THE USEFULNESS OF SCIENCE.

This wonderful discovery would never have been made if Kepler and Newton and other wise men had not found out the law that planets follow. And it would never have been made if the law was not everywhere and always the same.

A little while ago I said that it was very *useful* to know that the law of gravitation was everywhere and always the same. It is useful in all sorts of ways, but if I tell you about one it will be enough to show you just what I mean.

When a ship is at sea during the night, the captain can tell his position with the help of the stars. He knows that the Pole Star is always due north, so that he can steer his vessel by using the Pole Star as a guide. Again, if he notes the position of certain stars he can, by looking at certain figures given him by astronomers, find out his position on the ocean.

The regular thing for a captain to do is to take

an "observation" of the sun at noon each day. He looks at the sun through a "sextant," which is a little instrument with a telescope and a scale marked off in angles. Again, with the help of the figures given him by astronomers he knows from the angles shown on the sextant just where his boat is. He can make a mark on his chart of the ocean showing the position of his boat at noon each day.

In all these observations he trusts the law of gravitation, because it is the law of gravitation that the sun and earth and all other things follow in their movements.

When his boat comes near the land, the captain has to take note of other lights than those given by sun and stars. In order to keep away from rocks and dangerous parts of the coast, and in order to guide his boat into harbour, he has to look out for lighthouses and lightships.

The position of these lighthouses and lightships is fixed by law, but not by a law like the law of gravitation. Governments decide where these lights are to be put. Governments make the law to suit themselves, and they can change it at any time if they want. Sometimes the lights are altered by accident. A lightship may be sunk in a gale or in a collision. Or a lighthouse may be swept away in a storm.

Perhaps in the stories you have read you have heard about "wreckers." These were wicked men who used to show false lights on lonely and dangerous parts of the coast so as to lure ships on to the rocks. When the ships were wrecked the wreckers

used to steal the cargo and wood that was washed ashore. If the wreckers were found out, they were severely punished, because their tricks with lights were the cause of men being drowned and good ships being lost. •

Now you can see the difference between a law like the law of gravitation and a law made by men. We use the same word for two things that are not really the same. Laws made by men can be broken, and we have to threaten people with punishment to keep them from breaking the law. But the laws of nature cannot be broken. They cannot be altered. *They are everywhere and always the same.*

FINDING OUT HOW THINGS HAPPEN.

Now we can come back to our question, "How do things happen?" We answer that question by finding out the law that they follow. All the wise men of the world—the astronomers, the biologists, the doctors, and so on—are busy finding out the law or rule that things obey. The astronomers find out the laws that the sun and planets and stars follow; the biologists find out how animals and plants grow; the doctors study how our bodies live and work; and so on. Once they have found out the true law of anything, they know that they can be sure that it acts everywhere and always the same. °

So you see that we have got a long way from the savage idea that things happen because spirits make them happen to please themselves, or in answer to

prayers and presents from people who are afraid of them. But it is not very easy to find the true law of a lot of things. Even after people gave up worrying about spirits they used to make wild guesses at how things happened.

I remember hearing a professor read a long list of the queer things that men once put in the water they used for "tempering" steel. To temper steel is to make it hard and tough, so that it can be used for chisels and knives and other tools with a sharp edge. The steel is first made white-hot in a furnace to make it soft and easily beaten into shape. Then it is allowed to cool till it changes to a certain colour, when it is plunged into water.

Some hundreds of years ago men used to put frogs' legs, and plants, and all sorts of queer fluids into the water. Every blacksmith had his own concoction, which he thought was the best, because it had frogs' legs or something else in it. And all the time it was the water which really tempered the steel. When the hot steel is put into water it is suddenly cooled; and it is this sudden cooling that makes the steel hard and tough.

After a while men began to find this out. They began to find that nothing but water was needed to temper steel.

We are apt to laugh at the solemn way in which these old men pretended that they knew the secret of tempering steel. After all, it was just plain water that was wanted! But it is only little by little that men learn how things happen. And we have not

learned everything yet about even such a common thing as steel. Hundreds of clever men are busy learning the secrets of different kinds of steel. They keep on trying new ways of making steel. You might spend all your life studying nothing but steel, and you would still have a lot to learn when you were too old to study any more.

GUESSING AND KNOWING.

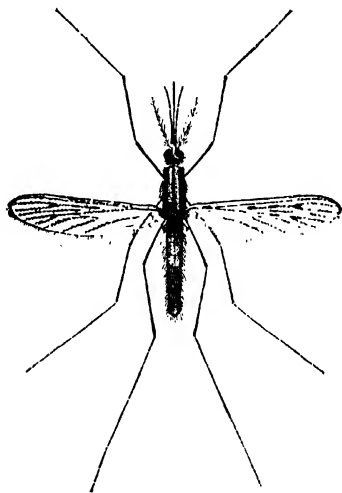
Now you may ask me how we know that our guesses are wrong. How do we know when we have found the true law?

Well, "the proof of the pudding is in the eating." We try or "test" the law to see if it really works. I have just told you how the law of gravitation helped us to find the planet Neptune. The finding of the planet Neptune was a kind of test of the law of gravitation. It proved that the law really worked.

I shall tell you another story to show you the difference between guessing and knowing.

In books of travel you must often have read about the fevers which men catch in tropical countries. Malaria and "yellow fever" are two of these "tropical diseases," as they are called. It was noticed long ago that these fevers were worst of all near swamps. So people guessed that the swamps were the cause of the fevers. The mists which hung over the swamps after the sun had set were supposed to be most dangerous.

The real cause of malaria is so strange that nobody could ever have guessed it. It was found out only by long and patient study of the disease. About thirty years ago a Frenchman named Laveran discovered that the blood of people who had malaria swarmed with tiny little animals. These animals



The Spot-Winged Mosquito that spreads malaria.

are so very tiny that they can be seen only through a very strong microscope. They are pointed at both ends, like the new moon, but often one end is curved one way and the other end the other way.

If by any chance these little animals were to get

into your blood, they would give you malaria. And if you can manage to keep these animals from getting into your blood, you will not catch malaria.

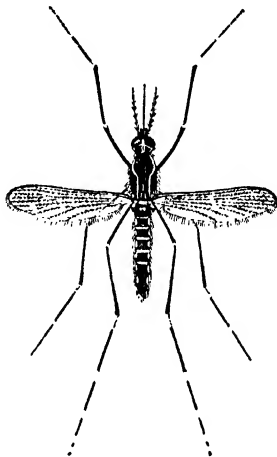
How, then, do these tiny things get into the blood of people who live in hot countries? Sir Ronald Ross was the first man to answer this question. He found that a special kind of mosquito—the spot-winged mosquito—carried these deadly animals from one man to another. When this mosquito bites a man, it sucks some of his blood. If that man has malaria, the mosquito will suck up some of the little animals that are in the man's blood. Then away goes the mosquito and bites another man, giving him a dose of the poison with the bite.

You can see for yourself that if we could kill all the spot-winged mosquitos we could keep people from catching malaria. It seems almost impossible to kill these mosquitos, there are so many of them. But they lay their eggs in stagnant water, like the water in swamps, or pools, or cisterns; and this habit gives us a chance of snuffing them out altogether. If all the swamps are drained dry, all the pools drained or covered with oil, and all the cisterns closed in, the mosquitos will have no chance of laying their eggs. After the old mosquitos have died there will be no young mosquitos to grow up and follow the wicked ways of their parents!

That is how we fight malaria nowadays. And we are winning the fight because we have found

out just how malaria is caused. We know *the law of malaria*.

Many other diseases are carried by mosquitos and other insects in the same sort of way. "Yellow fever," which I spoke about a little while ago, is carried by another special kind of mosquito. When



The Mosquito that spreads yellow fever.

the great French engineer, Ferdinand de Lesseps, who made the Suez Canal, tried to make a canal across the Isthmus of Panama his workmen died "like flies" from yellow fever and malaria. Nobody knew the law of yellow fever in those days. Nobody knew how yellow fever "happened."

The first Panama Canal Scheme had to be given up long before it was finished. When the United States Government made up its mind to drive a canal across the Isthmus it took steps to stamp out yellow fever and malaria. For so many miles on both sides of the line of the canal, pools and swamps were drained. Nobody suffering from yellow fever was allowed to come into that part of the country. Mosquito nets were used over doors and windows to keep out any stray mosquitos.

All this meant a great deal of trouble. But it was worth while. Instead of men dying by the hundred, there were very few cases of either yellow fever or malaria.

It has been said that "the Panama Canal was made by doctors." This means that the doctors discovered how to fight the fevers, and if they had not found out what they did the death-rate would have been so terrible that men could not have been got to work on the canal.

A HERO OF SCIENCE.

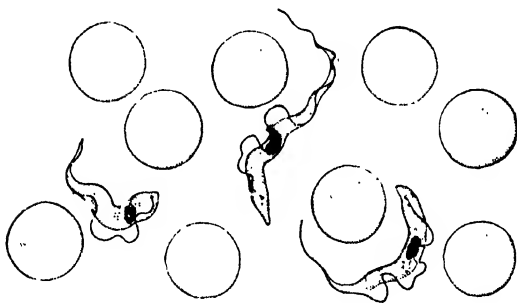
In the newspapers and in your story books you read about heroes who give their lives to save somebody on the battlefield or at sea. I would like to tell you about another kind of hero.

In Uganda (Africa) two hundred thousand natives died in five years from the disease called "sleeping sickness." This disease is carried by one of the flies called Tsetse flies, just as malaria is by the

spot-winged mosquito. Some years ago an army doctor called Lieutenant Tulloch went out to Uganda with some other doctors to study the disease and find out a cure. They all risked their lives in the search, and Lieutenant Tulloch caught the disease and died from it.

ALL KNOWLEDGE IS USEFUL.

The things that men have found out about these terrible diseases are among the greatest wonders of

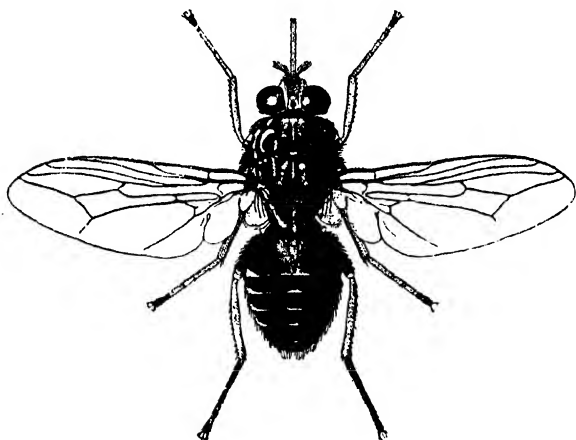


The queer-looking curly things in this picture are the microbes that give people sleeping-sickness when put in their blood by a bite from a Tsetse Fly. They are shown 1,500 times bigger than they really are. (The circles are red "blood-corpuscles.")

the world. And I think the most wonderful thing about them is that they should be found out by studying such trifles as gnats and flies.

Even fleas, bugs, and common house flies carry

disease. If you did not know that, you might think that people who spent years in finding out how bugs and fleas and gnats and flies lived were wasting their time. Instead of which, they were really finding out laws that have helped us to save thousands and thousands of lives, and to prevent an untold amount of pain and sickness.



This is the Tsetse Fly, the insect that spreads "sleeping-sickness." The picture is five times bigger than the fly in real life.

This is worth thinking about quietly. The men who sit looking through microscopes at tiny little living things, or who roam the wilderness collecting and watching all sorts of tiny pests and vermin, are the men who save countless lives.

You would be very proud if you saved one life. How would you feel if you found out something that would save millions of lives? You would be a million times more proud! And the only way you could do it would be by asking yourself questions about it, by finding out all you could about it, and discovering "how it happens."

UNKNOWN MEN OF SCIENCE.

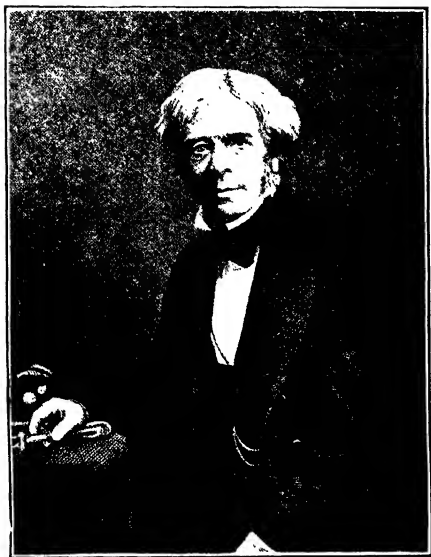
The name we give to men who spend their lives finding out the hidden laws of things is "men of science." Science means knowledge. Knowledge is knowing things; and knowing things is finding out how things happen.

You read in your history books a great deal about Kings and Queens and Popes and Cardinals and Nobles and Soldiers. But you read very little about men of science, although they have done far more for the world than any ruler ever did.

Why is this? Why should the men who have found out wonderful things, and made great inventions, be put on one side for Kings and Queens and all the others?

I think it is because people do not understand how useful the men who find out things really are. The Kings and Queens were given great power; they could start wars and make new laws very much as they pleased. And everybody knew what the Kings and Queens were doing.

But the men of science—the men who found out



PHILIP MICHAEL FARADAY, a great man who made many wonderful discoveries about electricity.

things—were not in places of power. They were just "ordinary people." Most of them were poor; many of them were very poor. They did their work very much in secret, and often they died before the world knew how useful their work was.

Electricity is one of the most wonderful and useful things in the world. It can light our houses, cook our food, warm our rooms, drive our trains and tramways and ships, work all kinds of machinery, send a message for us round the world in a few seconds, allow us to talk with people hundreds of miles away, and cure many diseases. And the man to whom we really owe all these amazing triumphs was Michael Faraday.

He was a poor man who worked away quietly, in the laboratory of the Royal Institution in London, with magnets and coils of wire. He did not care for money or fame. All he thought about was finding out how things happened. The discoveries he made were the seeds from which grew all the wonders of the electrical world.

Have you ever heard of the Abbot of Bränn? Very likely not. You will know something about Cardinal Wolsey and Cardinal Richelieu, but I do not suppose you know about Gregor Johann Mendel, the humble Abbot of Bränn, who was in some ways more wonderful than Wolsey or Richelieu.

The Abbot, who was born in 1822, spent his leisure time in studying the common garden pea. There are ever so many different kinds of peas, some tall, some "dwarf," some with smooth seeds, some

with wrinkled seeds, and so on. Mendel wanted to find out the law by which peas, grown from two different kinds of parent-peas, were sometimes like one parent and sometimes like the other. He grew thousands and thousands of plants before he found out the law, which is now known as "Mendel's Law." He wrote a paper on it, and read the paper before a local natural history society. But nobody thought it was of any importance, and his work was forgotten until long after he was dead.

Mendel's Law is not an easy thing to explain. I am not going to try and explain it to you, but I want to tell you about how useful its discovery turned out to be.

Plants have diseases, just as men and other animals have diseases; and one of the diseases which attack wheat is known as "rust." It has nothing to do with the rust we find on iron. The disease is called "rust" because it turns the wheat to the colour of rust.

With the help of Mendel's Law a special kind of wheat was produced which could not be attacked by "rust." By using this wheat, farmers can save their wheat from a disease which often destroyed the whole crop.

It is sometimes said that a really useful man is one who makes two blades of corn grow where one grew before. Mendel, although he lived and died unknown and unhonoured, made thousands of grains of wheat grow where none could be grown before.

THE LOVE OF FINDING OUT.

All the same, Mendel was not thinking about usefulness while he worked on year after year. He was not thinking about usefulness, any more than he was thinking about fame or wealth. He worked just for the love of finding out how things happened. He set out in search of the Law in much the same way as Columbus set out to find the New World.

Looking for the Law of electricity, or of the stars, or of family likenesses in garden peas, is like a hunt for hidden treasure, except that when the Law is found it is a treasure that is shared with all the world.

You have heard of the Emperor Alexander the Great, who "sighed for more worlds to conquer." You may have read that explorers are sorry that so little of our world remains undiscovered. Except for some parts of the regions near the North Pole and the South Pole, there is hardly a corner of the world which man has not visited. But when a man of science sets out to discover how things happen, he never gets to the end of the journey. There are always more worlds for him to conquer. As soon as he has found out one Law, there is another waiting over the next hill to be discovered in turn. And so on for ever and ever!

In this book I have given you just a few glimpses of some of the Laws that are everywhere and always the same. I have told you about the Laws that

shaped the earth and the plants and animals upon it; the Laws under which our religions and our notions of right and wrong grew up. When you yourself grow up it may be your luck to find out some new Law. You may be an astronomer, or a botanist, or a doctor, or an electrical engineer. But even if you do not spend your life as a man of science, trying to find out how things happen, you will, I hope, enjoy reading about what the men of science are finding out for you.

There are some people in the world who are often "bored." They do not know what to do to pass the time away. I have met lots of people like that, and they are all people who have given up asking questions about things. They do not care a fig about how things happen. I have also met many men of science and many people who like to learn the Laws that tell us how things happen. These people are never "bored." There is always something new before them, some fresh chapter in the Book of the World waiting to be read.

AFTER YOU LEAVE SCHOOL.

After you leave school or the university your education is said to be "finished." You are supposed to have learned all that you need to learn. But any one who has just left school is very much like a bird that has just learned to fly.

When a bird leaves the nest and starts life for itself it has to make use of what it has learned from

its parents. It has to find food, to take shelter in cold and stormy weather, to keep out of the way of cats and hawks and other enemies. In doing these things for itself it becomes clever.

So, when you leave school and go into the world to earn your own living, you have to use the things you learned at school. But you have to learn many new things for yourself. You have to keep your eyes and ears open. And you will find such a heap of things to learn that you will feel like saying to yourself: "My education is not finished. It is only just beginning."

Then you will find that the best thing you learned at school was the love of finding out all about everything. I know that many boys and girls say: "Oh, won't it be lovely when I leave school! I shall shut up all those horrid, dry books, and never have to learn any lessons any more!" I know that many school books do seem so dry that they make you feel you would like to read nothing but story books all the rest of your life. All the same, there is a big difference between being set to learn something and learning it for yourself. When you set out to learn it for yourself, it is like going on a voyage of adventure. There is far more fun in it, and you will not mind working hard at it, any more than if you were a sailor going to the South Sea Islands with Captain Cook.

I hope, at any rate, that you have not found this book so dry that you will not want to learn more about how the world was made, where the plants

and animals came from, and how men found out all they know about the wonders of the world. I hope I have made you hungry to learn more.

The world is a feast of wonders. And the most wonderful thing about the feast is that everything which comes on the table is fresh and delightful, and the more you eat the hungrier you become for more!

THE END.

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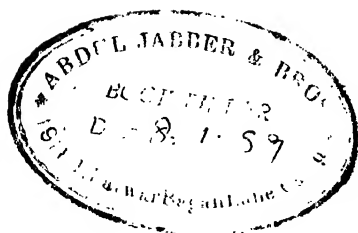
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